

This project is funded by the Horizon 2020 Framework Program of the European Union

Built2Spec

Built to Specifications – Tools for the 21st Century Construction Site
H2020 Grant Agreement – 637221

D3.4 IAQ specifications

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Deliverable nature:	Report (R)
Dissemination level: (Confidentiality)	Public (PU)
Contractual delivery date:	M14 – February 29 th , 2016
Actual delivery date:	April 14 th , 2016
Version:	1.1
Total number of pages:	126
Keywords:	Indoor air quality, measurement tool, indicator, man machine interface, platform

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ACKNOWLEDGEMENT

This document is a deliverable of the BUILT2SPEC project which has received funding from the European Union’s Horizon 2020 Research and Innovation Program under Grant Agreement no. 637221.

Executive summary

The **Deliverable D3.4** entitled “IAQ specifications” is a public document delivered in the context of WP3, Task 3.2: Indoor Air quality.

This work is part of the project on Tools for the 21st Century Construction Worksite (BUILT2SPEC) and is financed by the European Union under the Horizon 2020 Program.

This deliverable D3.4 aims to set specifications for the Indoor Air Quality (IAQ) analyser/ metasensor, the indicators, the man machine interface, and the BIM platform. The aims of these solutions are to facilitate the measurements of the IAQ onsite, and to relate the information to the user in an explicit way so anyone could use the apparatus onsite, be able to interpret the results, and act in consequence (even non trained people).

This document is structured as follows:

- A general introduction presents the context of the task,
- An analysis of the IAQ context (legislation and market)
- The work about the selection of the most relevant parameters is then presented,
- From this list, the relevant indicators are defined,
- The ideal way to treat and present these results has been them determined along with the recommended actions to be taken
- Using these criteria, the specification for the IAQ analyser has been defined

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Abbreviations

B2S = Built to Specifications

DOA = Description of Action;

CS = Communication Strategy;

WP = Work Package.

2 Introduction

The deliverable 3.4 is the first deliverable written in the context of the task 3.2. This task will lead to the development of an air quality analyser along with survey indicators. These tools will allow checking some equipment, analyzing indoor air pollutant sources, protecting the workers during the building construction, and protecting the users during the building's occupation. Indoor air quality (IAQ) has in the past few decades become problematic and it has become a real public health issue because people now spend about 85% of their time indoors. In the BUILT2SPEC framework, it is necessary to integrate some means to identify any health risk using the *survey* platform. The targeted developments in this framework will integrate a set of miniaturized measurement solutions able to assess IAQ parameters, to analyse and treat the registered data, and to transfer the information into a VCMP platform integrated with BIM. This platform will integrate all the *tools and resources* developed in this project.

The deliverable 3.4 summarizes the information collected during the first step of this task which aims to determine the required specifications for the IAQ analyser, the indicators, and the man-machine interface.

During this preliminary step, the nature of the air constituents and their characteristics which will be monitored was determined. Thus it was decided if physical parameters (T, RH, %CO₂), chemical pollutants, physical pollutants (particles), or bio-contaminant will be measured. The nature of the selected compounds has a direct impact on the final analyser specifications and structure (sensor totally integrated or composed of numerous solution blocks).

According to the selected compounds and parameters, the feasibility to build one or more indicators was studied. These indicators will make the results easier to read for the users. During this first stage of work the feasibility of the creation of these indicators and the associated specifications was studied.

The detailed specifications for the IAQ interface and for the BIM platform is then described. This interface will have an informative role on the presentation of IAQ results, but also interactive functions making possible an exchange with the users. Especially, this platform will propose recommendations or corrective actions according to the IAQ results observed.

Finally, the specifications of the sensor or analyser which will allow on-site measurements were defined. At the end of this work, the design, the dimensions, the autonomy, and the typology of the sensor were determined.

3 IAQ context

We breathe about 12,000L of air per day. This air is composed of several compounds among which some have been determined as dangerous for human health. IAQ constitutes a major issue for human health as we spend 85% of our time indoor¹ where we are exposed to indoor pollutants. These pollutants can be biological (bacteria, spores, viruses), chemical (volatile organic compounds), or physical (radon, dust, particulate matter.). There are many sources of pollutants: construction and decoration materials, human activities (cooking, smoking), consumer products (air fresheners, perfumes, adhesives, carpets), furniture, and outdoors pollutants.

IAQ is a major issue affecting human health. Indeed, in 2012, WHO reported that bad air quality was responsible for 600,000 deaths per years within the EU, among which 118,000 can be attributed to poor IAQ.² It has a significant economic impact due to lost time at work and in education. Even though the costs are very hard to determine precisely as the impacts are still not well known, all the studies estimate the costs to several tens of billions of euros. For example, the US EPA (Environmental Protection Agency) estimated that sick leave due to poor IAQ cost about 20 billion dollars every year within the USA (lost productivity, compensation and healthcare), and that these costs could even reach 120 billions of dollars if the loss of productivity due to the staff absence is taken into account.³ Also, in 2015, WHO estimated that the deaths and the sicknesses caused by poor IAQ cost about 1,430 billion euros per year over the 28 countries in the EU.⁴

The specification for the IAQ analyser will strongly depend on the legislation for IAQ in the EU and the rest of the world as this type of legislations tends to align with the strictest regulations worldwide. In order to have an overview of the legislation and of the common practices about IAQ in the countries from which the partners are from, a survey was sent to the most relevant partners of the BUILT2SPEC project of each country (France, Germany, Ireland, Italy, Netherlands, Spain, and United Kingdom). The survey and the answers of the partners can be found in the Annex 1.

In order to complete this information and to have a better overview of the legislation worldwide, a deep analysis was then conducted. We researched the IAQ legislation for twelve more countries so our database

¹ Anses - Agence nationale de sécurité sanitaire de l'alimentation de l'environnement et du travail, "Qualité de l'air" [Online] Available: <https://www.anses.fr/fr/content/qualité-de-l'air>. [Accessed: 29-Apr-2015].

² WHO, 2014, "Almost 600 000 deaths due to air pollution in Europe: new WHO global report" [Online] Available at: <http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/news/news/2014/03/almost-600-000-deaths-due-to-air-pollution-in-europe-new-who-global-report>. [Accessed: 14-Apr-2016].

³ T. Gonsoulin and T. Worthan, 2009, "The consequences of bad IAQ," [Online] Available at: <http://www.facilitiesnet.com/iaq/article/The-Consequences-Of-Bad-IAQ-Facilities-Management-IAQ-Feature--10618>

⁴ WHO Regional Office for Europe, OECD, 2015, "Economic cost of the health impact of air pollution in Europe: Clean air, health and wealth". Copenhagen: WHO Regional Office for Europe.

is from 19 countries in total including: Hungary⁵, Mexico⁶, Estonia⁷, Belgium⁸, Argentina⁹, Austria¹⁰, Denmark¹¹, USA¹², Australia¹³, New Zealand¹⁴, Switzerland¹⁵, and Canada¹⁶.

3.1 Legislation and common practices about IAQ

3.1.1 Legislation

The analysis revealed that there are generally not many regulations for IAQ in most of these countries. Most of the legislation is regarding workplace exposure limits, which correspond to the pollutants' concentration values considered acceptable for different time exposures. For housing and buildings open to the public, there is no specific legislation for IAQ, though building regulations generally require a minimum amount of ventilation. The values given by national agencies regarding workplace exposure limits are quite high for each pollutant compared to the values given by national institutes. The values found for the different countries are summarized in Annex 2 (long time exposure) and in Annex 3 (short time exposure).

⁵ Limit values Hungary: Ministry of Health and Ministry of Social and Family Affairs on the Chemical Safety at Work, Annex 1, **2000**, Article 25/2000.(IX.30.) EüM-SZCSM együttes rendelet: A munkahelyek kémiai biztonságáról, 1.melléklet, Magyar Közlöny, 99 szám 6150-6178 old. módosítva a 13/2002 (XI.28.) ESZCSM – FMM és a 13/2006 (III. 23.) EüM-FMM együttes rendelettel, elérhető: Joint Decree No. 25/2000.(IX.30.) EüM-SZCSM issued by the., Magyar Közlöny, Vol 99, pp 6150 - 6178, modified by Joint Decree No 13/2002(XI.28.) ESZCSM – FMM and Joint Decree No 13/2006 (III. 23.) EüM-FMM. Available at: www.mhk.hu

⁶ Limit values Mexico: Secretaria del trabajo y prevision social segunda seccion, **1999**, NORMA Oficial Mexicana NOM-010-STPS-1999, Condiciones de seguridad e higiene en los centros de trabajo donde se manejen, transporten, procesen o almacenen sustancias químicas capaces de generar contaminación en el medio ambiente laboral.

⁷ Limit values Estonia: Government of the Republic, **2001**, Regulation n° 293 Töökeskkonna keemiliste ohutegurite piirnõrmi, RT I 2001, 77, 460. Available at: <https://www.riigiteataja.ee/akt/12874145>

⁸ Limit values Belgium: Service Publique Fédéral Emploi, Travail et Concertation Sociale, **2014**, Arrêté royal modifiant l'arrêté royal du 11 mars 2002 relatif à la protection de la santé et de la sécurité des travailleurs contre les risques liés à des agents chimiques sur le lieu de travail

⁹ Limit values Argentina: Ministerio de Trabajo, Empleo y Seguridad Social, **2003**, Resolución 295/2003 Apruébanse especificaciones técnicas sobre ergonomía y levantamiento manual de cargas, y sobre radiaciones.

¹⁰ Limit values Austria: Bundesministers für Arbeit, Soziales und Konsumentenschutz, **2011**, Grenzwerte für Arbeitsstoffe sowie über krebserzeugende und über fortpflanzungsgefährdende (reproduktionstoxische) Arbeitsstoffe (Grenzwerteverordnung 2011 – GKV 2011)

¹¹ Limit values Denmark: Arbejdstilsynet, **2007**, At-Vejledning – STOFFER OG MATERIALER – C.0.1 (Limit Values for Substances and Materials)

¹² Limit values USA: Occupational Safety & Health Administration, **1999**, Regulations, Standards - 29 CFR, Part 1910 - Occupational Safety and Health Standards, Subpart Z - Toxic and Hazardous Substances, Section 1910 – 1000 –Air contaminants

¹³ Limit values Australia: Safe Work Australia, **2013**, Workplace Exposure standards for Airborne Contaminants. Available at: www.safeworkaustralia.gov.au

¹⁴ Limit values New Zealand: Ministry of Business, Innovation and Employment, **2013**, Workplace Exposure Standards and Biological Exposure Indices. Available at: www.mbie.govt.nz.

¹⁵ Limit values Swiss: Suva, Protection de la santé au poste de travail, **2014**, Valeurs limites d'exposition aux postes de travail 2014

¹⁶ Limit values Canada: National Research Council Canada, **2005**, Indoor Air Quality Guidelines and Standards

Annex 5 presents the detail of the values found for the EU countries of the B2S partners: France¹⁷, Germany¹⁸, Ireland¹⁹, Italy²⁰, Netherlands²¹, Spain²², and United Kingdom²³.

Although there are not strong national or global regulations in place, there exists a lot of standards and guideline values that have been defined by organizations or institutes working in this area. There is generally at least one institute working in this area in each country. The World Health Organization (WHO) has developed several guideline values for nine selected pollutants²⁴ that have been recognized as dangerous for human health. The values given by WHO, Europe²⁵, Environmental and Occupational Health & Safety (ANSES)²⁶, and the values given for labelling in France²⁷ are summarized in Annex 4. These pollutant concentration values are much more restrictive than the ones for workplace exposure limits, and one can think that these values will become standards in the future.

¹⁷ Limit Values France: Le ministère de l'emploi, du travail et de la cohésion sociale et le ministère de l'agriculture, de l'alimentation, de la pêche et des affaires rurales, **2004**, Arrêté du 30 juin 2004 établissant la liste des valeurs limites d'exposition professionnelle indicatives en application de l'article R. 23255 du code du travail

¹⁸ Limit values Germany: Bundesministerium für Arbeit und Soziales, 2006, Technische Regeln für Gefahrstoffe, Arbeitsplatzgrenzwerte, TRGS 900 and TGRS 910; Available at: <http://www.baua.de/de/Themen-von-A-Z/Gefahrstoffe/TRGS/TRGS-900.html>

¹⁹ Limit values Ireland: Health and Safety Authority, **2011**, 2011 Code of Practice for the Safety, Health and Welfare at Work (Chemical Agent) Regulations 2001. S.I. No. 619 of 2001.

²⁰ Limit values Italy: Ministero del Lavoro e delle Politiche Sociali – Ministero della Salute, **2008**, Criteri di qualificazione della figura del formatore per la salute e sicurezza sul lavoro, articolo 6, comma 8, lett. m-bis, del Decreto Legislativo n. 81/2008 e s.m.i., Allegato XXXVIII.

²¹ Limit values Netherlands: Minister van Sociale Zaken en Werkgelegenheid, **2016**, Arbeidsomstandighedenregeling. Available at <http://wetten.overheid.nl/BWBR0008587/20160401/0/afdrukken>

²² Limit values Spain: Instituto Nacional de Seguridad e Higiene en el Trabajo (INSHT), **2008**, Limites de exposicion profesional para agentes quimicos en Espana

²³ Limit values United Kingdom: Health and Safety Executive, **2011**, EH40/2005 Workplace exposure limits

²⁴ WHO, **2010**, Guidelines for indoor air quality: selected pollutants, ISBN 978 92 890 0213 4

²⁵ The Commission of the European Communities, **2006**, COMMISSION DIRECTIVE 2006/15/EC of 7 February 2006 establishing a second list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Directives 91/322/EEC and 2000/39/EC

²⁶ ANSES, **2015**, Expertise en appui à l'étiquetage des produits d'ameublement

²⁷ Le ministère de l'écologie, du développement durable, des transports et du logement - le ministère de l'économie, des finances et de l'industrie - le ministère du travail, de l'emploi et de la santé, **2011**, Arrêté du 19 avril 2011 relatif à l'étiquetage des produits de construction ou de revêtement de mur ou de sol et des peintures et vernis sur leurs émissions de polluants volatils

The following table gives the most restrictive value for the most relevant pollutants (the explanation of this choice of pollutants will be detailed in section 4 (Monitored parameters)) :

Pollutant name	Concentration threshold: long time exposure ($\mu\text{g}/\text{m}^3$)	Concentration threshold: short time exposure ($\mu\text{g}/\text{m}^3$)
Formaldehyde	10	30
Benzene	1.7	30
Naphtalene	10	30
Trichloroethylene	20	800
Tetrachloroethylene	250	1.380
Acetaldehyde	100	200
Toluene	300	3.000
Xylene	20	60
Styrene	30	300
1,2,4-trimethylbenzene	100	1.000
1,4-dichlorobenzene	60	300.000
Ethylbenzene	200	2.000
2-butoxyethanol	100	1.000
Acrolein	0.8	6.9
α -pinene	200	2.000
Limonene	1.000	10.000
TVOC	1.000	2.000
NO ₂	20	200
CO	7.000	30.000
PM 2.5	10	25
PM10	20	50

Table 1: Worldwid minimum concentration treshold value for the selected pollutants

3.1.2 IAQ evaluation and citizen's awareness

IAQ is becoming more of an issue due to the increase in the airtightness of new buildings that has been induced by new regulations for energy efficiency. In response to this matter, studies have been carried out to analyse the indoor air quality of a panel of representative buildings in several countries.

In Europe, at a national level, the most extensive studies have been carried out by Germany and France. The Federal Environment Agency in Germany has conducted a five studies since 1985²⁸ in order to determine the exposure of the German population to pollutants and its relationship with health issues. Each study had different objectives, but they are all linked as one of the objectives was to follow the evolution of IAQ over the years:

- The first stage (1985-1986) targeted the exposure of the population to 18 heavy metals such as aluminum, arsenic, and barium, to pesticides such as lindane, and to VOCs. They tested 2700 adults living in 100 different cities, distributed in 465 buildings. This first study revealed that almost all the housing presented VOC concentration values much higher than the guide values for the majority of the pollutants such as benzene and formaldehyde. Indeed, the median

²⁸ C. Schulz, A. Conrad, K. Becker, M. Kolossa-Gehring, M. Seiwert, & B. Seifert, *Int. J. Hyg. Environ.-Health*, **2007**, 210, 271–297; More information available at: <http://www.umweltbundesamt.de/en/topics/health/assessing-environmentally-related-health-risks/german-environmental-survey-geres>

concentration value for benzene was more than 3 times higher than the guide value ($7.2 \mu\text{g}/\text{m}^3$) and the median concentration for formaldehyde was more than 5 times higher than the guide value ($55 \mu\text{g}/\text{m}^3$).

- The second study (1990-1992) has been realized both in the former East Germany and in the former West Germany on 4287 adults and 812 children distributed in 861 houses in 150 different locations. This second study also focused mostly on heavy metals, pesticides and VOCs, but new components such as semi-volatile organic compounds (SVOCs) and biocides were also analysed. Generally, the pesticides concentration values are very low (median value at $0.3 \mu\text{g}/\text{g}$). However, the maximum values can be very high as $270 \mu\text{g}/\text{g}$ of permethrin was measured on one person. Also, the formaldehyde concentration was still very high with a median value at $70 \mu\text{g}/\text{m}^3$, 7 times the guide value.
- The third study (1997-1999) has been realized in 120 different cities on 4822 adults distributed in 750 different houses which were chosen in order to be representative of the German population (size of the household, sex, and age). The majority of the compounds measured here are different from the two previous studies. They systematically studied compounds such as biocides, polychlorobiphenyles (PCB), and others pyrethrinoides. In 200 of the houses flame retardant (phthalate and organophosphates) and polychloro sulfonamide diphenylethers were analysed. In one hand, they could observe that the concentration values of biocides and PCB are very different from one house to another, the major compounds found for these two pollutant types being the PCP and the PCB138 respectively. On another hand, the concentration values of the phthalates and organophthalates are present in every house, the dominant compounds for these two families being the DEHP and the TBEP respectively.
- The fourth study (2003-2006) had the objective to study the impact of the pollution on children, who are more sensitive to environmental factors. Indeed, these factors will act on the development of neurotoxins during the prenatal phase and on the endocrine system during puberty. These data had already been collected during the previous phases but only concerned children whose age was between 6 and 14. In this study, the data was updated and took into account the children whose age was between 3 and 5, and 1800 children in total were recruited (between 3 and 14 years old). They were selected from the same 150 cities in the second study. In each city, 12 children were picked (3 in each age category: 3-5 years old, 6-8 years old, 9-11 years old, and 12-14 years old). For this study, the analysed compounds were: heavy metals, organochlorines (PCB, DDE, HCB, and β -HCH), nicotine, cotinine, organophosphate, PCP and other chlorophenols, polycyclic aromatic hydrocarbons metabolites and pyrethroid metabolites. VOCs concentration values were also analysed, and it was demonstrated that the median concentration value of the formaldehyde was more than twice the guide value ($25.7 \mu\text{g}/\text{m}^3$) and that more than 90% of the houses presented concentration values higher than the guide value. However, the concentrations values of the toluene found are inferior to the one of the guide value, and the concentration of benzene was quite good as 50% of the houses present concentration values under the guide values and 98% of the houses present values three times lower than the short term exposure guide. They also measured the impact of noise on the children.

In France, “L’Observatoire de la Qualité de l’Air Intérieur” (OQAI, Indoor Air Quality Monitoring Centre) conducted several studies²⁹ since 2003 on dwellings, offices, and schools. Among these studies, some of

²⁹ a) L. Mosqueron, S. Kirchner, V. Nedellec, *Environnement, Risques & Santé*, **march - april 2002**, p. 31-41 ; b) S. Kirchner, N. Pasquier, M. Derbez, O. Ramalho, C. Iannaccone, *TSM - Techniques Sciences & Méthodes*, **july-august 2005**, p. 34-42; c) C. Mandin, S. Kirchner, *Pollution Atmosphérique*, 185, **january-march 2005**, p. 59-68. ;

them have been realized in the context of European projects and have been realized on buildings across 23 European countries. Overall, these studies revealed that:

- 1) The IAQ in offices is generally good as the pollutant concentration values are generally lower than the guide values. The major source of pollutants in offices being the cleaning products. For this case, we can clearly see that the problem comes from the user and that it can be corrected by installing good practices such as using cleaning products that release less harmful compounds.
- 2) In schools, the evaluation showed that 89% of the schools present a concentration in formaldehyde lower than $30 \mu\text{g}/\text{m}^3$ which is the guide value for short term exposure. However, only 43% of the schools presented satisfactory benzene concentration values ($< 2 \mu\text{g}/\text{m}^3$) and 27% of the buildings contained at least one room which was not enough ventilated. Overall, 31% of the schools responded to all the criteria of the studies, 11% of the schools are encouraged to search for formaldehyde and benzene sources, and 2% of them contained rooms without any air renewal.
- 3) Regarding dwellings, the formaldehyde and the benzene concentration values are higher than their respective guide values for almost all the buildings in France.

Overall, these studies revealed that the IAQ is poor in a majority of buildings. They also revealed that the causes of this poor IAQ is a combination of several factors among which the lack of ventilation and the users' behavior are the most important. The improper sizing, setup, and the absence of maintenance of the ventilation systems significantly impact the IAQ in a building. Users' behavior, cleaning products, smoke, air fresheners and the lack of adequate ventilation have been identified as key factors in poor IAQ. As buildings are built or retrofitted to achieve increased airtightness for energy efficiency the need for designed and effective ventilation systems increases.

These studies indirectly show that self-inspection techniques for ventilation systems and measures during the design and construction stages could help to improve IAQ and that portable self-assessment techniques during and after construction would be useful.

3.2 IAQ Analysers on the market

The current R&D on indoor air quality (IAQ) measurement systems focuses on two axes that tend to merge.

The first axis is about the development of portable equipment (devices) for scientific applications, devices that possess a high measurement accuracy (see section 2). For example, in the PRIMEQUAL2 project in 2013, a portable formaldehyde analyser which weights approximately 8 kg and measures $28.5 \times 23 \times 38$ cm was developed³⁰. This technology was later transferred to a start up (In'Air Solutions)³¹. This project has since been taken over by the CNRS which started a new project aiming to develop a formaldehyde micro-analyser.

d) S. Kirchner, *Revue des Maladies Respiratoires*, **february 2007**, p. 236-237 [doi:10.1016/S0761-8425(07)91047-5]; e) S. Kirchner, J.F. Arènes, Cochet C., M; Derbez, C. Duboudin, P. Elias, A. Grégoire, B. Jédor, J.P. Lucas, N. Pasquier, M. Pigneret, O. Ramalho, *Environnement, Risques & Santé*, **july-august 2007**, p. 250-269 [doi : 10.1684/ers.2007.0096]; f) C. Mandin, M. Derbez, J.P. Lucas, O. Ramalho, A. Grégoire, M. Lethrosne, J. Ribéron, S. Kirchner, *Pollution atmosphérique*, **april - june 2010**, 206, p. 159-165; g) S. Kirchner, M. Derbez, C. Duboudin, P. Elias, J. Garrigue, A. Grégoire, J.P. Lucas, N. Pasquier, O. Ramalho, N. Weiss, *AIVC Contributed Report*, **2009**, 30 p.

³⁰ S. Le Calvé, M. Guglielmino, W. Zheng, P. Bernhardt, S. Englaro, M. Emo, M. Brogat, S. Becker, **2013**, "Analyseur du formaldéhyde dans l'air - Réalisation d'un prototype transportable automatisé et piloté", Final Report.

³¹ "In'Air solutions" [Online] Available at: <http://www.inairsolutions.fr/services-et-produits/nos-produits/>

The second and new axis of R&D, detailed in section 3, concerns the development of simple and connected devices that can be used by the "general public". Compared to the devices developed for scientific applications, these systems are generally less accurate, better designed, connected, and present a simplified user interface. Data are collected, analysed and can be seen at any time by the user on tablets, computers, or smartphones. Moreover, this type of sensors starts to be associated with other electronic systems such as humidity and temperature controllers in order to improve the IAQ. The paragraphs 3.2.1 and 3.2.2 present a non-exhaustive list of these analysers.

3.2.1 High accuracy systems for indoor air quality measurement

3.2.1.1. Gas concentration measurement devices

➤ Blue Industry and Science – Blue X-FLR8 IAQ Monitoring³²



- Real time measurements
- Multi- gas capacity at ppb level
- Volatile organic compounds (VOCs) measured: formaldehyde, benzene, toluene, xylene, phthalate esters, nitrogen dioxide, trichloroethylene, and many other gases (several hundreds)
- Simultaneous measurements at ppb level
- Source detection mode

➤ Bacharach – IEQ Check³³



Utilisation range (T°C, HR)	-5°C to + 55°C / - 0 to 99.9%
Precision (T°C, HR)	± 0.1°C / - ± 0.1%
TVOC	Measurement range : 0 – 2 ppm
Dimensions	19.7 cm x 9.8 cm x 7.8 cm 567 g

Table 2 : IEQ Check specifications

Depending on the model, this system can measure the following parameters:

- Temperature
- Humidity
- Carbon dioxide (CO₂) concentration
- Carbon monoxide (CO) concentration
- Oxygen (O₂) concentration
- Formaldehyde (HCHO) concentration

³² “Blue Industries – Blue X-FLR8 IAQ Monitoring” [Online]

Available at: <http://www.blueindustryandscience.com/products/x-flr8-iaq-monitoring/>

³³ “Bacharach – IEQ Check” [Online] Available at: <http://www.mybacharach.com/ieq-chek.htm>

- Nitrogen dioxide (NO₂) concentration
- Nitrogen monoxide (NO) concentration
- Sulphur dioxide (SO₂) concentration
- Total Volatile Organic Compounds (TVOCs) concentration
- Ammonia (NH₃) concentration
- Hydrogen sulphur (H₂S) concentration

➤ **EcoLogicSense - e-VOC³⁴**



Utilisation range (T°C, HR, P)	-20°C to + 50°C / 0 to 90% / 800hPa to 1100HPa
Precision (T°C, HR, P)	± 0.5°C (from 5 to 40°C) / ± 3% (from 20 to 80% HR) / ± 2.5hPa
TVOC	Measurement range : 0 to 2 ppm
Technology	Photo Ionisation detection (10.6 eV)
Detection Limit	5 ppb
Uncertainty	+/- (2% of reading value + 5 ppb)
Power	Rechargeable battery
Autonomy	1 to 3 weeks
Dimensions	16 x 16 x 6 (cm) 800 g

Table 3 : e-VOC specifications

➤ **Ethera – NEMo³⁵**



³⁴ “EcoLogicSense - e-VOC” [Online]

Available at: <https://sites.google.com/site/ecologicsense/produits/smart-city/capteur-de-cov>.

³⁵ “Ethera – NEMo” [Online] Available at: <http://www.etheralabs.fr/1-39430-NEMo-Next-Environmental-Monitoring.php>.

- Nano-porous sensor technology for a selective measurement of formaldehyde($\mu\text{g}/\text{m}^3$)
- CO_2 measurement by NDIR sensor
- Possible extension to other gases

CO₂ / TIGHTNESS	
Detection method	NDIR
Measurement range	0 to 5000 ppm
Resolution	1 ppm
Uncertainty	+/- 50 ppm (+/- 3 % of reading value)
Response time	< 30 seconds
FORMALDEHYDE	
Detection method	Optical reading on consumable made of porous nano-material (patented technology)
Measurement range	0 to 2000 ppb (0 to 2.5 mg/m^3), according to the exposure time
Sensibility	Up to 1 ppb according to the exposure time
Sampling Method	Passive diffusion
Difference with DNPH method	< 25 %
Consumable conservation	Conservation between 2 et 8°C
TEMPERATURE	
Sensor type	CMOS
Measurement range	-25°C to +55°C
Resolution	0.08°C
Precision	+/- 2°C over the full range (+/- 1°C from 0°C to 55°C)
HUMIDITY	
Sensor type	Capacitive
Measurement range	0 to 95 % (+/- 3 % of the reading value)
Resolution	0.08 %
Precision	+/- 5 % over the full range (+/- 3 % from 20°C to 55°C)
PRESSURE	
Sensor type	CMOS
Measurement range	300 to 1100 hPa
Resolution	+/- 0.01 hPa
Precision	+/- 1 hPa

Table 4 : NEMo specifications

➤ **Environnement SA**³⁶



³⁶ “Environnement SA”

[Online] Available at: http://www.environnement-sa.fr/products-page/fr/surveillance_qualite_air/analyseurs_gaz/.

Can contain the following gas sensors:

- AC32M : nitrogen oxide
- AC32M-CN₃ : ammoniac and nitrogen oxide
- AF22M : sulphur dioxide
- AF22M-TRS : sulfur dioxide and other sulfur reduced compounds
- CO12M : carbon monoxide, carbon dioxide and methane
- HC51M : total hydrocarbons
- O342M : ozone
- VOC72M : 6 measured compounds in standard configuration : benzene, toluene, ethyl benzene, p-xylene + m, o-xylene, 1,3 butadiene (other compounds on request)

➤ **Cairpol – CairSens³⁷**



The integrated system CairSens is composed of an amperometric sensor, a dynamic sampling air system, a patented filter, and an electronic circuit. The combination of these elements allows a real-time display of the measured concentrations and an internal data backup. The specific filter limits the effects of the relative humidity variation on the measurements. The combination between this filter and the dynamic sampling results in the excellent reliability of the measurement. Moreover, the concentrations measured are equivalent to the ones measured with reference methods thanks to the performance of the sensor. Miniaturization and low power consumption of micro-sensor, originally designed for a portable version (CairClip), enable the deployment of autonomous stations with CairTub release, or of wireless networks with CairNet release.

- O₃/NO₂ : measurement range 0 to 250 ppb
- H₂S/CH₃SH : measurement range 0 to 1000ppb or 0 to 10/20 ppm
- NH₃ : measurement range 0 to 25 ppm
- COV : measurement range 0 to 16 ppm

³⁷“Cairpol – CairSens” [Online] Available at:
http://www.cairpol.com/index.php?option=com_content&view=article&id=6&Itemid=107&lang=fr.

➤ SLG instrument – Gas sensor³⁸



The sensor has a multi-parameters and multi-points wireless system.

Different gas sensors are available:

Gas	Ref	Resolution (ppm)	Max. Zero offset in ppm (+20 +40°C)	Life time (year)
<u>CO</u>	ESO101	1	9	3
<u>NO₂</u>	ESO108	2	0.2	2
<u>SO₂</u>	ESO111	2	0.1	2
<u>SO₂</u>	ESO112	1	1	2
<u>H₂S</u>	ESO119	1	0.1	2
H ₂	ESO132	2	-35	2
<u>O₂</u>	ESO140			2
<u>O₃</u>	ESO146	5	0.04	2
<u>NO</u>	ESO104	1	9	3
<u>NH₃</u>	ESO115	10	10	1
<u>VOC</u>	ESO150	0.01 Isobutylene	Humidity : <1 ppm at 90% RH	1
<u>VOC</u>	ESO152	1	Humidity : <1 ppm at 90% RH	

Table 5: Gas sensor specifications

³⁸ “SLG instrument – Capteurs de gaz” [Online] Available at: <http://www.slg-instruments.com/air-interieur.php>.

3.2.1.2. Particulate matter measurement devices

➤ EcoLogicSense - e-PM³⁹



Utilisation range (T, HR, P)	-10°C to + 50°C - 0 to 95% - 800hPa to 1100HPa
Precision (T°C, HR, P)	± 0.5°C (5 to 40°C) ± 3% (20 to 80% HR) ± 2.5hPa
Measure particles	PM 2.5 & PM 10 (0 to 200 µg/m ³)
Technology	Dispersive light detection
Communication	Wireless Range : 200m
Power	Rechargeable battery
Autonomy	1 to 3 weeks
Dimensions	16 x 16 x 6 (cm); 800 g

Table 6 : e-PM specifications

➤ Environnement SA

CPA⁴⁰



CPA is an optical dust analyser

- Particles counts : up to 1000 particles/s
- Measurement range : 0.4-1 µm; 1-2.5 µm; 2.5-5 µm; 5-10 µm; 10-20 µm; 20-40 µm
- Concentration range : up to 1 mg/m³
- Optical evaluation with a spectral library
- Detection limit : ≤ 2 ± 2 µg/m³
- Temporal resolution : 10 seconds
- Particles nature estimation (by family)

³⁹ “EcoLogicSense - e-PM”

[Online] Available at : <https://sites.google.com/site/ecologicsense/produits/smart-city/capteur-de-particules>

⁴⁰ “Environnement SA - CPA” [Online] Available at: http://www.environnement-sa.fr/products-page/fr/surveillance_qualite_air/analyseurs_preleveurs_particules/cpa-analyseur-de-particules-en-continu/?cat=29.

MP101M (with CPM option) ⁴¹



Weight measurement independent of the physico- chemical nature, the color, and the size of the particles, with a moving average of 24 hours.

Complies the following standards: European EN12341 (PM 10), EN14907 (PM 2.5) and US EPA (PM 10 and PM 2.5).

- Measurement range : 0 to 10 000 $\mu\text{g}/\text{m}^3$
- Detection limit : 0.5 $\mu\text{g}/\text{m}^3$ (24h average)
- Count time : 10 to 300 secs, programmable

➤ **Greywolf – GW-3016**⁴²



GrayWolf GW-3016 measures 6 particles sizes (0.3, 0.5, 1.0, 2.5, 5.0 and 10 μm). It is possible to read the particles number, the total collected particles number and the concentration in $\mu\text{g}/\text{m}^3$.

⁴¹ “Environnement SA - MP101M” [Online] Available at: http://www.environnement-sa.fr/products-page/fr/surveillance_qualite_air/analyseurs_preleveurs_particules/mp101m-avec-option-cpm/?cat=29.

⁴² “Greywolf - Gw3016” [Online] Available at: <http://www.actu-environnement.com/materiels-services/produit/gw-3016-appareil-portable-mesure-particules-fines-air-1393.php>.

➤ Turnkey instruments - Dustmate⁴³



Two measurement modes:

- The “environmental mode” gives the particles concentration for TSP, PM 10, PM 2.5, and PM1
- The “workplace mode” gives the breathing and thoracic particles concentration

It is equipped with a Nephelometer laser with the characteristics:

- Detection limit: 0.1 $\mu\text{g}/\text{m}^3$ to 6000 $\mu\text{g}/\text{m}^3$,
- Particles size range: 0.3 to 15 μm ,
- Memory storage: up to 40 days for a measurement every minute

3.2.1.3. *Double measurement devices (gases and particulate matter)*

➤ Greywolf – Wolfsense⁴⁴



- Simultaneous measurement of 6 parameters: VOC concentration, CO₂ concentration, CO concentration, temperature, humidity and a possibility for an additional gas.
- Optional for particulates matter measurement (number or concentration)
- Optional sensor for wind speed measurement
- A maximum of 4 Greywolf sensors over 20, and a particulate matter sensor can be connected on any support
- Optional Integrated pressure sensor

⁴³ “Dustmate” [Online] Available at: <http://www.turnkey-instruments.com/environment.php?id=21>.

⁴⁴ “Wolfsense” [Online] Available at: <http://www.wolfsense.com/directsense-iaq-indoor-air-quality-monitor.html>

3.2.2 Connected devices for indoor air quality monitoring

➤ **Azimut – Fireflies** ⁴⁵



Monitored parameters are temperature, humidity, sound level, and CO₂, VOC and formaldehyde concentrations. The company makes full data analysis, diagnosis and support.

➤ **CubeSensors** ⁴⁶



Monitoring parameters are temperature, humidity, sound level, light, CO₂ and VOC concentrations, pressure, and vibration. This device can assess the environment quality and advises the user on action(s) to perform in order to improve it and preserve his health. Analyses charts are accessible from any web navigator or from a smartphone application.

Price : 235 € for two cubes (2014)

➤ **Netatmo** ⁴⁷



Netatmo is a weather station with two modules: one for outside purpose that measures the temperature, the humidity and the pressure of the atmosphere, and one for indoor purpose that measures the temperature, the humidity, the pressure, the CO₂ level, and the sound level. Measurements can be consulted on smartphones or tablets.

Moreover, all data are recovered and compiled in order to create a collaborative map of the outside air quality.

Price: 169 € (2014)

⁴⁵ “Azimut - Fireflies” [Online] Available at: <http://www.azimut-monitoring.com/>

⁴⁶ “CubeSensors” [Online] Available at: <https://cubesensors.com/>

⁴⁷ “netatmo” [Online] Available at: <https://www.netatmo.com/fr-FR/site>

➤ **Lapka** ⁴⁸



Lapka is a connected object with different modules made of plastic or wood which allows the user to customise its design. Each module contains a sensor. The company sells radioactive particles sensors, electromagnetic field sensors, nitrates sensors, and humidity sensors. Data are processed via an application available on smartphones or tablets which indicates if the concentrations measured can be harmful for the user health or not.

Price : 249 € (2014)

➤ **AirAir** ⁴⁹



Air.Air is a device that measures the air particles concentration and the temperature. All data can be consulted on a smartphone or a tablet application.

Price: 70\$ (2014)

➤ **TZOA** ⁵⁰



TZOA is a small object which measures the air temperature, the humidity, the light intensity, the UV-light intensity, and the particles concentrations. Data are collected via a Bluetooth connection on the user's smartphone. They can be consulted with the TZOA application.

Moreover, this device can be clipped (on a bag for example). Measurements can be performed all day depending on your position. All data are recovered and compiled on a server in order to create a collaborative map of the outside air quality.

Price: 100 € (2014)

⁴⁸ "Lapka" [Online] Available: <https://mylapka.com/>.

⁴⁹ "AirAir" [Online] Available: <http://www.airair.info/>.

⁵⁰ "TZOA" [Online] Available: <http://www.mytzoa.com/#homepage>.

➤ **Airboxlab - Foobot⁵¹**



Foobot is composed of 6 sensors which measure: VOC concentration, CO₂ concentration, carbon monoxide concentration, small particles concentration, temperature, and humidity. Measurements are analysed and can be consulted on a smartphone application. In this application, some advices are given in order to help the user to improve his/her indoor air quality.

Price: 169 € (2014)

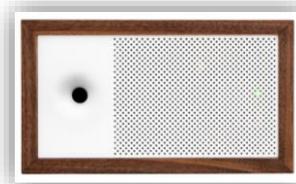
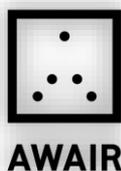
➤ **Air Mentor⁵²**



Monitoring parameters: COV concentration, VOC concentration, CO concentration, PM 10 concentration, PM 2.5 concentration, temperature, and humidity. Measurements are analysed and results can be consulted on a smartphone application. In this application, some advices are given in order to help the user to improve his/her indoor air quality.

Price: 250 € (2015)

➤ **Awair⁵³**



Awair is a connected device which monitors the air temperature, the humidity, and the CO₂, VOC and small particles concentrations. It can be connected to others air quality devices such as filters, air conditioning systems, ventilation, thermostats, air purifiers, and humidifiers in order to automatically maintain a good indoor air quality.

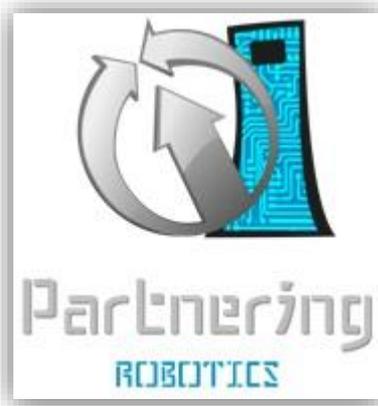
Price: 199 \$ (2015)

⁵¹ “Foobot” [Online] Available: <http://foobot.io/how.html>.

⁵² “AirMentor” [Online] Available: <https://www.air-mentor.com/>. [Accessed: 10-Jul-2015].

⁵³ “Awair” [Online] Available: <https://getawair.com/> [Accessed: 10-Jul-2015]

➤ Partnering Robotics - Diya One ⁵⁴



Diya One is a robot which can navigate in the indoor environment. This robot is an open platform containing an air purifier with a PM 2.5 filter processing 75 m³ of air per hour. It can possess sensors such as humidity, temperature and particles sensors, or others technologies. It can also measure the electric consumption by connecting itself to the electric meter.

Price: 5000 € (2015)

➤ Withings – Home ⁵⁵



Home is a camera containing VOC and light sensors. All data are collected on a smartphone application.

Price: 200 € (2014)

3.2.3 Conclusion

Overall, we can see that there is a trend towards devices miniaturization, simplification, and connection. Scientific devices, with a high precision, cover all the range of indoor air parameters. However, connected devices for the general public present a better design and cover a useful range of indoor air parameters. They also target other parameters in relation with indoor environment. The tables below present a comparison between the parameters measured by scientific and general public devices.

⁵⁴ “Partnering Robotics - DiyaOne” [Online] Available at: <http://partnering-robotics.com/home-fr.html>

⁵⁵ “Withings - Home.” [Online] Available at: <http://www.withings.com/fr/withings-home.html>.

Parameters	Scientific devices	General public devices
Temperature	Yes	Yes
Humidity	Yes	Yes
Sound	No	Yes
Vibration	No	Yes
Pressure	Yes	Yes
Light	No	Yes
UV	No	Yes
Particles	Yes	Yes
Dioxygen	Yes	No
Carbon dioxide	Yes	Yes
Carbon monoxide	Yes	Yes
Formaldehyde	Yes	Yes
VOC	Yes	Yes
Nitrogen compound	Yes	Yes
Sulphur compound	Yes	No
Magnetic field	No	Yes

Table 7 : Device's parameters

Scientific devices features	General public devices feature
Real time measures	Real time measures
Portability	Portability
Increasing modularity	Little modularity
High precision	Low precision
Little connectivity	High connectivity
No	Give advices

Table 8 : Device's feature

At first, we can conclude from this list that scientific (precise) devices presents a high accuracy, a high modularity (you can add or remove sensors according to need), and a good portability, but none of them are connected. Indeed, at best, they possess a Bluetooth connection that allows the user to follow the real time measurements on smartphones or tablets.

In contrast, systems for a larger audience are well connected. They possess connections via Bluetooth, internet and applications (data collection and analyses, advices to the user in order to improve his/her environment). Unfortunately, there is no data on the accuracy of such devices. These devices allow a good overview of the indoor environment quality and they can inform and educate the user on the practises which help to maintain a good indoor environment quality. This user awareness could lead naturally to improve his/her indoor environment and life quality. This would result in actions such as regular airing of the room or better choices for building, furniture, and decoration materials. These choices will be facilitated

by several present and future regulations about the labelling of construction, decoration and furniture materials emissions. However, the development of these systems is limited to “Kickstarter” for now and their prices are high for a single person. Although their connectivity remains their main asset, it does not exist any interconnectivity between devices, which limits the number of measured parameters. However, there is a trend to interconnection as it can be seen with the air cleaner Home Wave which uses the Foobot device analysis in order to optimize itself.

The presence of these new technologies on the market reflects that there is a trend towards more creation of connected objects. From this observation, we can imagine that common objects such as cameras or smoke sensors will soon contain new sensors able to monitor the indoor environment. Driven by these developments, extensive research has been conducted in order to create new sensors (made of semiconductor for example⁵⁶) which are more accurate, less expensive⁵⁷, and smaller. Once these objectives are reached, these new sensors could be integrated in buildings very quickly. We hope that it will be the case for the devices developed in the European project IAQSense⁵⁸ that will contain new nano-sensors. This project ends in 2016. .

The aim of the BUILT2SPEC project is to develop an IAQ analyser which combines the benefits from both categories in order to perform self-assessment during the construction and occupancy phases.

⁵⁶ M. Leidinger, T. Sauerwald, T. Conrad, W. Reimringer, G. Ventura, and A. Schütze, *Procedia Eng.*, **2014**, vol. 87, pp. 1449–1452.

⁵⁷ S. Abraham and X. Li, “A Cost-effective Wireless Sensor Network System for Indoor Air Quality Monitoring Applications,” *Procedia Comput. Sci.*, **2014**, vol. 34, pp. 165–171.

⁵⁸ “IAQ Sense,” 2014 [Online] Available: <http://www.iaqsense.eu/> [Accessed: 14-Jan-2015]

4 Monitored parameters

According to the studies presented in the literature, IAQ is often assessed by measuring the pollutants concentration in a room, and also, by measuring other parameters such as temperature and relative humidity.

There are a large amount of pollutants present in indoor air. In order to define which compounds the B2S Analyser will focus on we cross referenced the data collected from 19 countries around the world regarding the regulations and the guide values (France⁵⁹, Germany⁶⁰, Ireland⁶¹, Italy⁶², Netherlands⁶³, Spain⁶⁴, United Kingdom⁶⁵, Hungary⁶⁶, Mexico⁶⁷, Estonia⁶⁸, Belgium⁶⁹, Argentina⁷⁰, Austria⁷¹, Denmark⁷², USA⁷³,

⁵⁹ Limit Values France: Le ministère de l'emploi, du travail et de la cohésion sociale et le ministère de l'agriculture, de l'alimentation, de la pêche et des affaires rurales, **2004**, Arrêté du 30 juin 2004 établissant la liste des valeurs limites d'exposition professionnelle indicatives en application de l'article R. 23255 du code du travail

⁶⁰ Limit values Germany: Bundesministerium für Arbeit und Soziales, 2006, Technische Regeln für Gefahrstoffe, Arbeitsplatzgrenzwerte, TRGS 900 and TGRS 910; Available at: <http://www.baua.de/de/Themen-von-A-Z/Gefahrstoffe/TRGS/TRGS-900.html>

⁶¹ Limit values Ireland: Health and Safety Authority, **2011**, 2011 Code of Practice for the Safety, Health and Welfare at Work (Chemical Agent) Regulations 2001. S.I. No. 619 of 2001.

⁶² Limit values Italy: Ministero del Lavoro e delle Politiche Sociali – Ministero della Salute, **2008**, Criteri di qualificazione della figura del formatore per la salute e sicurezza sul lavoro, articolo 6, comma 8, lett. m-bis, del Decreto Legislativo n. 81/2008 e s.m.i., Allegato XXXVIII.

⁶³ Limit values Netherlands: Minister van Sociale Zaken en Werkgelegenheid, **2016**, Arbeidsomstandighedenregeling. Available at <http://wetten.overheid.nl/BWBR0008587/20160401/0/afdrukken>

⁶⁴ Limit values Spain: Instituto Nacional de Seguridad e Higiene en el Trabajo (INSHT), **2008**, Limites de exposicion profesional para agentes quimicos en Espana

⁶⁵ Limit values United Kingdom: Health and Safety Executive, **2011**, EH40/2005 Workplace exposure limits

⁶⁶ Limit values Hungary: Ministry of Health and Ministry of Social and Family Affairs on the Chemical Safety at Work, Annex 1, **2000**, Article 25/2000.(IX.30.) EüM-SZCSM együttes rendelet: A munkahelyek kémiai biztonságáról, 1.melléklet, Magyar Közlöny, 99 szám 6150-6178 old. módosítva a 13/2002 (XI.28.) ESZCSM – FMM és a 13/2006 (III. 23.) EüM-FMM együttes rendelettel, elérhető: Joint Decree No. 25/2000.(IX.30.) EüM-SZCSM issued by the., Magyar Közlöny, Vol 99, pp 6150 - 6178, modified by Joint Decree No 13/2002(XI.28.) ESZCSM – FMM and Joint Decree No 13/2006 (III. 23.) EüM-FMM. Available at: www.mhk.hu

⁶⁷ Limit values Mexico: Secretaria del trabajo y prevision social segunda seccion, **1999**, NORMA Oficial Mexicana NOM-010-STPS-1999, Condiciones de seguridad e higiene en los centros de trabajo donde se manejen, transporten, procesen o almacenen sustancias químicas capaces de generar contaminación en el medio ambiente laboral.

⁶⁸ Limit values Estonia: Government of the Republic, **2001**, Regulation n° 293 Töökeskkonna keemiliste ohutegurite piirnormid, RT I 2001, 77, 460. Available at: <https://www.riigiteataja.ee/akt/12874145>

⁶⁹ Limit values Belgium: Service Publique Fédéral Emploi, Travail et Concertation Sociale, **2014**, Arrêté royal modifiant l'arrêté royal du 11 mars 2002 relatif à la protection de la santé et de la sécurité des travailleurs contre les risques liés à des agents chimiques sur le lieu de travail

⁷⁰ Limit values Argentina: Ministerio de Trabajo, Empleo y Seguridad Social, **2003**, Resolución 295/2003 Apruébanse especificaciones técnicas sobre ergonomía y levantamiento manual de cargas, y sobre radiaciones.

⁷¹ Limit values Austria: Bundesministers für Arbeit, Soziales und Konsumentenschutz, **2011**, Grenzwerte für Arbeitsstoffe sowie über krebserzeugende und über fortpflanzungsgefährdende (reproduktionstoxische) Arbeitsstoffe (Grenzwerteverordnung 2011 – GKV 2011)

⁷² Limit values Denmark: Arbejdstilsynet, **2007**, At-Vejledning – STOFFER OG MATERIALER – C.0.1 (Limit Values for Substances and Materials)

⁷³ Limit values USA: Occupational Safety & Health Administration, **1999**, Regulations, Standards - 29 CFR, Part 1910 - Occupational Safety and Health Standards, Subpart Z - Toxic and Hazardous Substances, Section 1910 – 1000 –Air contaminants

Australia⁷⁴, New Zealand⁷⁵, Switzerland⁷⁶, and Canada⁷⁷). We analysed the data given by organisations with good reputations in the IAQ domain such as WHO⁷⁸, Europe⁷⁹, and ANSES⁸⁰.

This data showed that there is a huge gap between the values given for work exposure limits and the ones given as guide values. Indeed, even for pollutants considered as very dangerous for the occupants' health such as the benzene, there is a factor 1000 between the work exposure limit and the guide value. This phenomenon shows that the authorities have not taken the matter very seriously to date, but that there is a trend for the improvement of the IAQ on the long term.

From this analysis, we also found that 25 pollutants which appeared as essential to follow when it comes to IAQ: Formaldehyde, Benzene, Naphtalene, Trichloroethylene, Tetrachloroethylene, Acetaldehyde, Toluene, Xylene, Styrene, 1,2,4-trimethylbenzene, 1,4-dichlorobenzene, Ethylbenzene, 2-butoxyethanol, Acrolein, α -pinene, Limonene, Hexanal, delta-3-carene, TVOC, NO₂, CO, CO₂, PM 2.5, PM10, and radon.

These are measured in most of the countries and most of them appeared in the new regulation about material labelling. **Ideally, all these pollutants should be assessed by the analyser but this list could be reduced depending on the relevance to assess these different components during the different phases of a building.** For example, **we could rule out the TVOC's** as its relevance is very low. Indeed, the TVOC concentration takes into account all the organic compounds with a chain containing between 6 and 12 carbon. However, some organic compounds with this criteria are not harmful so it will not have an impact on the occupants' health and is then irrelevant to measure for the worker safety. For the indoor air pollutants, it could be also envisaged to classify them according to their impact on human health.

In addition to pollutants, there are other parameters which can affect an occupants' health. Temperature and relative humidity inside a building can lead to condensation and mould growth which in turn leads to mould spores in the air which are unhealthy if inhaled. These parameters should also be assessed during an IAQ analysis of a building.

⁷⁴ Limit values Australia: Safe Work Australia, **2013**, Workplace Exposure standards for Airborne Contaminants. Available at: www.safeworkaustralia.gov.au

⁷⁵ Limit values New Zealand: Ministry of Business, Innovation and Employment, **2013**, Workplace Exposure Standards and Biological Exposure Indices. Available at: www.mbie.govt.nz.

⁷⁶ Limit values Swiss: Suva, Protection de la santé au poste de travail, **2014**, Valeurs limites d'exposition aux postes de travail 2014

⁷⁷ Limit values Canada: National Research Council Canada, **2005**, Indoor Air Quality Guidelines and Standards

⁷⁸ WHO, **2010**, Guidelines for indoor air quality: selected pollutants, ISBN 978 92 890 0213 4

⁷⁹ The Commission of the European Communities, **2006**, COMMISSION DIRECTIVE 2006/15/EC of 7 February 2006 establishing a second list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Directives 91/322/EEC and 2000/39/EC

⁸⁰ ANSES, **2015**, Expertise en appui à l'étiquetage des produits d'ameublement

5 Indicators and indexes

5.1 Parameters organization

Although all the parameters are important to monitor they can be divided into different categories and sub-categories depending on their source and nature of their impact. Temperature and relative humidity can also impact human health in terms of thermal, physiological and psychological comfort.. These two parameters will also be placed in a category that we will call “comfort”.

Although CO₂ is an indoor air pollutant, it is only dangerous above very high concentration that are rarely reached. However it has a direct impact on the productivity of the people in the room and can lead to discomfort, headaches and lack of concentration.. It is produced by human activity so it can provide useful information as an indicator of the air renewal in the room and the effectiveness of the ventilation system. We will therefore treat the CO₂ separately and we will call this category “confinement”.

The third category is pollution and we decided to divide the pollutants in two sub-categories depending on their sources: indoor and outdoor. By separating these two categories it is possible to identify quickly the origin of the pollution and to see which component of the building has to be checked to improve the IAQ (filtration system, construction materials, cleaning products).

The schematic representation of the indicators tree structure is given in the Figure 1.

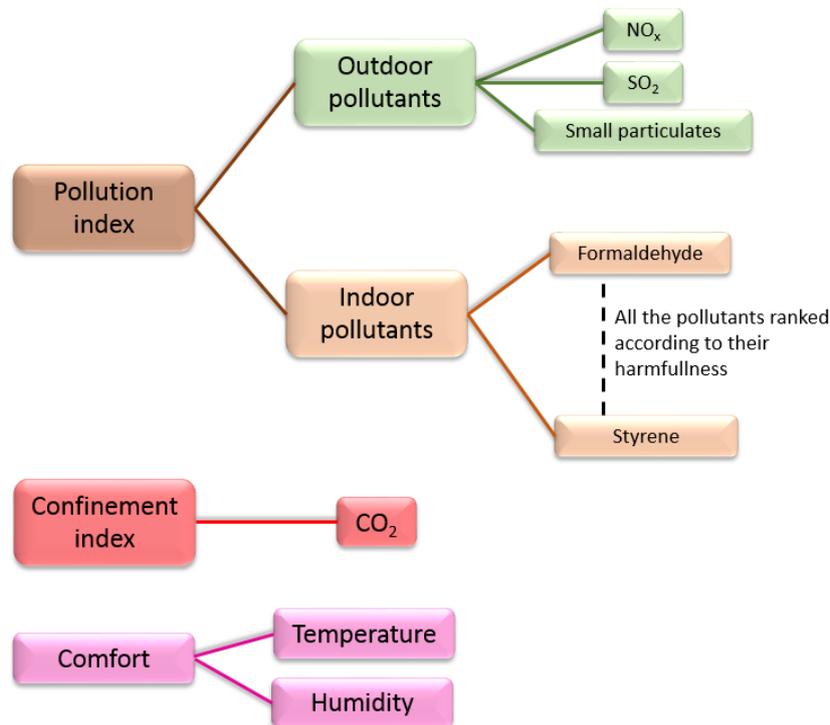


Figure 1: Tree structure schematic of the IAQ indicators

5.2 Indices

5.2.1 Pollution indices

In the literature, we can find several types of indexes that have been built from these indicators. The OQAI presented a review of these indexes which is quite complete.⁸¹ The indexes can be classified in different groups. A first group of indexes is calculated from data collected in the field. For this group of indices, the pollutant concentration is generally compared to the values measured in a panel of buildings. It is the case of the “Indoor Air Pollution Index” (IAP_I)⁸² which formula is:

$$IAP_I = \frac{1}{I} \sum_{i=1}^I \frac{1}{J} \sum_{j=1}^J \frac{1}{K} \sum_{k=1}^K 10 \left[1 - \frac{C_{i,j,k}^{\max} - C_{i,j,k}^{obs}}{C_{i,j,k}^{\max} - C_{i,j,k}^{\min}} \left(\frac{C_{i,j,k}^{dmc} - C_{i,j,k}^{obs}}{C_{i,j,k}^{dmc}} \right) \right]$$

For $C^{\max} > C^{obs}$ and $C^{dmc} > C^{obs} > C^{\min}$

Where I is the number of level-3 groups in the IAP_I tree structure, $I = 2$; J is the number of level-2 groups in each level-3 group, $J = 2$; K is the number of level-1 pollutant variables in each level-2 group, $K = 2$; max is the maximum measured concentration; min is the minimum measured concentration; dmc is the demarcation concentration; obs is the measured concentration in the subject building. The problem of this type of index is that they are based on the results obtain on the IAQ measured in existing buildings. In consequence, if all the buildings of the study presented bad IAQ, even a polluted building could present a good index.

The second category of indices that we can find in the literature are the ones based on pollutants guide values. This type of indices sums the ratios (pollutant_n) / (pollutant_n guide value) which is divided (or not) by the number of pollutants taken into account in the sum. This is the case of the index CLIM 2000 which has been set by Electricité de France (EDF), and the index LHVP which has been elaborated by le Laboratoire d’Hygiène de la Ville de Paris (L.H.V.P).

$$I_{CLIM} = \frac{1}{4} \left(\frac{CO_2}{4500} + \frac{CO}{30} + \frac{NO_2}{0,4} + \frac{HCHO}{0,06} \right) \quad I_{LHVP} = \frac{CO}{5} + \frac{CO_2}{1000} + \frac{DTB}{1000}$$

There are several issues of using this type of indices. First of all, they do not possess a weighted consideration of the pollutants and assume that all the pollutants have the same impact on the air pollution which is not true. Secondly, they assume that a “cocktail” of pollutants is more harmful than a single pollutant. However this last point is still under debate and no clear conclusion has been drawn yet. In consequence, this type of indices does not seem to be the most judicious to use in our case.

The third category of indices is an evolution of the second category as it is based on the same principle except that some pollutants count more than other. A weighting factor is then applied in the formula. This is the case of the Paris airport pollution index which estimates the contribution of PM₁₀ over the ones of CO and NO₂.

$$I_p = (3 \times I_{CO} + 3 \times I_{NO_2} + 6 \times I_{PM_{10}}) / 12$$

⁸¹ OQAI, Elaboration d’indices de la qualité de l’air intérieur- Phase 1: Inventaire des indices disponibles

⁸² D.J. Moschandreas & S.C. Sofuoglu, *Journal of the Air & Waste Management Association*, **2004**, Vol.54, p.1440-1451.

Among this category, we can also cite the GAPI⁸³ index which sums weighted pollutant concentration values. Here, the weighting is made by the factor W_i which is calculated according to the impact of the pollutant on human health (carcinogenic power, number of risk sentences listed in the INRS data sheet, etc.). This index can only be used to follow the evolution of the IAQ but is not relevant for the characterization of the IAQ as it is not calculated as an average but just a sum of the different pollutants present in the room. In consequence, it can vary a lot from one building to another.

$$GAPI = \sum_i W_i C_i$$

As the index from the second category, these indices suffers from the same drawbacks which is the addition of the pollutant effects, among others. However, installing a hierarchy between the pollutants according to their impact on human health appears very relevant to the IAQ issues. In consequence, it will be retained for the establishment of an index within the project.

The fourth indices category is based on the analysis of the pollutants concentration independently from one another. The air quality evaluation will be based on the pollutant which presents the highest concentration compared to its reference value. Among these indices, we can cite the BILGA index⁸⁴.

$$I_{BILGA} = \max [IAQ (P, T)] \quad IAQ(P,T) = \frac{E_{moy}^P - VRL_T^P}{VRI_T^P - VRL_T^P}$$

E_{moy}^P is the average exposure to the pollutant P for an exposure time T

VRL_T^P is the limited risk value of the pollutant P for an exposure time T

VRI_T^P is the important risk value of the pollutant P for an exposure time T

The index is defined as follow:

If $I_{BILGA} < 0$, the IAQ is excellent,

If $I_{BILGA} = 0$, the health risk is insignificant in the building,

If $0 < I_{BILGA} < 1$, the health risk encountered by the occupants is limited,

$I_{BILGA} > 1$, the health risk is unacceptable.

This type of indices is coherent with the evaluation of the IAQ during the different construction phases. However, the reference value used to calculate this index is the important risk value for which the occupants risk severe health damages. Then it cannot be used to evaluate moderate risks like the one for long term exposure, or even for the detection of pollution sources as the detection of such levels will imply the person to leave the room. This index is much more pertinent for detection of anomalies during the use of the building after the construction, for workers' safety for example.

In conclusion, we can notice that all of these indices present benefits and drawbacks but, overall, none of them fully satisfy our requirements. In consequence, we chose to use a new index that is

⁸³ S. Cariou & J.M. Guillot, "Utilisation d'un indice global de la qualité de l'air intérieur pour suivre l'ensemble des COV présents et leur impact sur la santé humaine", *Air Pur*, **2005**, n°69.

⁸⁴ M. Cohas, **1994**, Contribution à l'amélioration de la qualité de l'air intérieur des locaux d'habitation. Thèse de doctorat de l'Université Pierre et Marie Curie, Paris VI, p.210

based on the ones of the last category. Indeed, as the cocktail effect is still under debate for the moment, it seemed relevant to choose an index which takes into account the contribution of the pollutants separately instead of an index which sums the pollutants' effects. However, instead of the index proposed in the literature, we decided to compare the pollutant concentration value to the indoor air guide values, the guide value chosen for each pollutant being the most restrictive found in the literature. The pollutants will be classified according to their impact on human health.

5.2.2 Confinement indices

As explained in the section 4, we decided to exclude the CO₂ from the pollution index as it is not really harmful for human health unless reaching huge concentrations (>10,000ppm) that are never reached in normal usage. Besides, it can give useful information about the ventilation of the room as it is directly linked to human activity (cooking, breathing, etc.). In consequence, it is related to the confinement of the air in the room, and that is why this index is called "confinement index".

It has been proven that although CO₂ is not harmful for human health, it impacts directly the productivity of the occupants. Generally, the air is estimated as confined if the CO₂ concentration value is above 1,000ppm⁸⁵, and very confined if its concentration value reaches 1,400ppm (1,000ppm above the outdoor concentration value). We will then take these two values as reference in our project.

5.2.3 Comfort indices

Comfort is complicated to assess as it strongly depends on an individual's physiology. There are numerous indices that have been defined which are more or less complex. They rely on several parameters such as the weight and the size of a person, the flux of air exchanged between a person and its environment, the ventilation of the room, surface temperatures and many other variables. Although all these indices are very interesting in their approach, they are very complex to use in our project as it would require a deep understanding of the uses in a building and it would need to adapt the analyser to each case. As the goal of the project is to define a simple methodology that can be applied to the widest types of buildings, we decided to use a much simpler model.

Some studies show that the indoor environment is perceived as comfortable for most of the people when the temperature (T) is between 22.8 to 26.1°C in the summer and 20.0 to 23.6°C in the winter when the relative humidity (RH) is between 30% and 65%. Some charts have been developed to draw the comfort zone for the winter and summer periods (ASHRAE, standard 55)⁸⁶. We decided to use this ASHRAE Psychrometric Chart to define our comfort index.

⁸⁵ ASHRAE, 2013, Standard 62.1- Ventilation for Acceptable Indoor Air Quality (ANSI Approved)

⁸⁶ ASHRAE, 2013, Standard 55 - Thermal Environmental Conditions for Human Occupancy

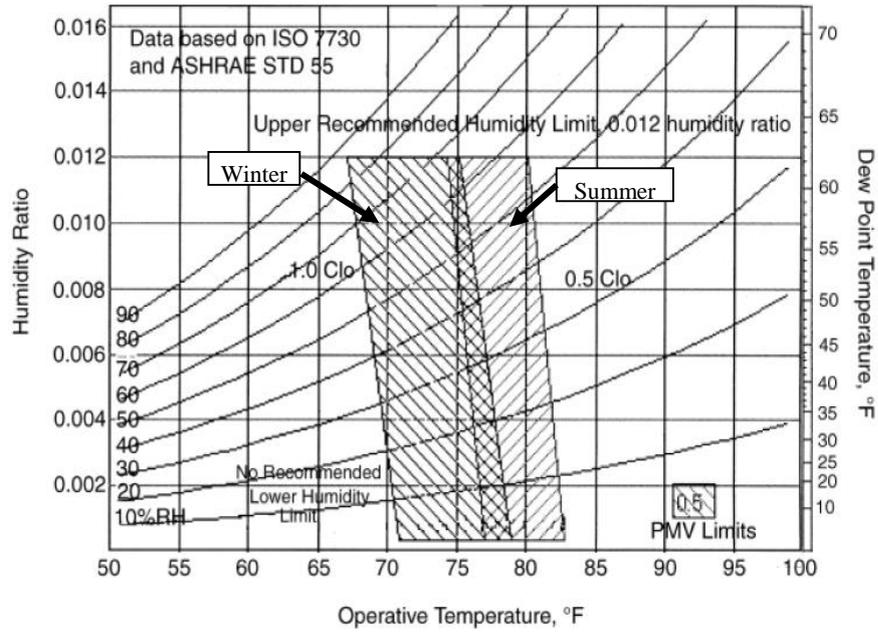


Figure 2: Psychrometric Chart showing the seasonal comfort zones in relation to T and RH

6 User Interface

The B2S IAQ Analyser is being designed to be used by a worker on a building site and not only by experts. In consequence, the user interface should be intuitive and easy to use.

The first step should allow the user to select which type of building site they are testing, new build or existing. Then they should be able to choose which type of use cases they will be testing: ie office, retail, industrial, housing. Next the user will have the possibility to see the measurement protocol if the user does not know the procedure and to start the measurement .

Once the user reaches the measurement step, the interface will be made in such manner that the user will only have to follow the instructions on the screen. For each step in the process, an image will be used if it helps the user following current best practices for user friendly interfaces.

Once the measurements have been completed the results will be displayed in a comprehensive manner. We plan that the user will immediately see the indices that have been defined in Section 5. Finally the interface will display possible remedial actions that the user could do considering the results. For experts, it is also planned to have other levels of information, where they can find in detail the data which has been measured and recorded by the device.

7 Analyser

The B2S Analyser will be used indoors so it needs to be portable, robust and to provide accurate measurements of the IAQ parameters in real-time. The following specifications are based on these requirements.

7.1 Metrology specifications

7.1.1 Limit of Detection

According to the parameters that we would like to measure and the index that we want to display on the interface, the meta-sensor in the analyser should be able to monitor the following pollutants, at concentrations relevant for IAQ, with a Limit of Detection at least 50% below the long term concentration threshold.

Pollutant name	Concentration treshold: long time exposure ($\mu\text{g}/\text{m}^3$)	Concentration treshold: short time exposure ($\mu\text{g}/\text{m}^3$)
Formaldehyde	10	30
Benzene	1.7	30
Naphtalene	10	30
Trichloroethylene	20	800
Tetrachloroethylene	250	1.380
Acetaldehyde	100	200
Toluene	300	3.000
Xylene	20	60
Styrene	30	300
1,2,4-trimethylbenzene	100	1.000
1,4-dichlorobenzene	60	300.000
Ethylbenzene	200	2.000
2-butoxyethanol	100	1.000
Acrolein	0.8	6.9
α -pinene	200	2.000
Limonene	1.000	10.000
TVOC	1.000	2.000
NO ₂	20	200
CO	7.000	30.000
PM 2.5	10	25
PM10	20	50

In addition to measuring these pollutants, the meta-sensor will need to monitor CO₂, relative humidity, and temperature.

7.1.2 Other metrology specifications (applicable to all parameters)

These specifications are based on standard specifications of high performance analysers with direct reading or real-time measurement.

Repeatability: LOD \pm 2% of reading.

Linearity: R² \geq 0.999.

Accuracy: $2 \times \text{LOD} \pm 2\%$ of reading.

Measurement range: for each target compound, from 0 (50% of LOD) to $3 \times$ (threshold for short term exposure).

Measurement time: typically 1s for one compound. A few minutes for multiple parameters.

7.2 Operational specifications

7.2.1 Environmental

Conditions at which the meta-sensor will operate and provide accurate performance.

Sample gas: ambient pressure and temperature

Operational temperature range: 15-35°C.

Operational pressure range: 700-1300 mbar

7.2.2 Ergonomy

Weight: less than 3 kilos.

Dimensions: 50 x 40 x 10 cm (indicative). One person should be able to displace the meta-sensor with one hand in a repeated fashion 50 times during a working day without harmful consequences.

Autonomy : the rechargeable battery should last up to 8 hours

Power supply: 110/220V

Physical interface: Ethernet, USB, Wifi, RS232, Analog output

7.3 Blue Analyser

The Blue X-FLR8 analyser has been developed to measure VOCs in real-time, directly on the field. It is a laser-based infrared spectrometer, with a Very High Resolution Tunable Laser that can be tuned over 800 wave numbers in the mid-IR region, with a spectral resolution of 0.01 cm^{-1} . This tunability enables to target multiple compounds with a single laser source.

The analyser generates laser impulses at predetermined wavelengths. These wavelengths are chosen taking into account parameters like target compounds, LODs, time to measure, cross-talk between the compounds. During the first stage of BUILT2SPEC, such a method has been developed and tested to measure Formaldehyde, Benzene and TEX.

The absolute limits of detection of the Blue X-FLR8 Analyser are as follows:

Pollutant name	Concentration treshold: long term exposure ($\mu\text{g}/\text{m}^3$)	Blue X-FLR8 Limit of detection ($\mu\text{g}/\text{m}^3$)	Potential target compound
Formaldehyde	10	10	YES
Benzene	1.7	125	NO
Naphtalene	10	91	NO
Trichloroethylene	20	528	NO
Tetrachloroethylene	250	28000	NO
Acetaldehyde	100	94	YES
Toluene	300	146	YES
Xylene	20	150	NO
Styrene	30	189	NO
1,2,4-trimethylbenzene	100		NO
1,4-dichlorobenzene	60	2092	NO
Ethylbenzene	200	82	YES
2-butoxyethanol	100	52	YES
Acrolein	0.8	125	NO
α-pinene	200	31	YES
Limonene	1.000	63	YES
TVOC	1.000		NO
NO ₂	20	93	NO
CO	7.000		NO
PM 2.5	10		NO
PM10	20		NO

These limits of detection of the Blue X-FLR8 analyser are stated for 10s of measurement for one gas. They do not take into account the potential cross-talk from other compounds. The current method will be expanded to include as many of the target compounds as possible. It will also include if possible the measurement of CO₂ and water.

8 Conclusion

In this deliverable, we have described the context of IAQ issues and we established an inventory of the common practices and of the analysers present on the market. From the exiting regulations and the guides that were written by national agencies, we performed a selection of parameters that the B2S analyser should be able to assess and we explained the reasons why we chose these parameters. We also established an inventory of the existing index and we defined the specifications for the index that we will create during this project. Finally, we outlined the user-interface and which information it will contain.

From all these information, we established the analyser specifications in the paragraphs 7.1 and 7.2. In the paragraph 7.3, we detailed the current performance of the Blue analyser. From the section 7, we can see that the technologies available today do not meet all the specifications that we set regarding the assessment of the pollutants and of the physical parameters. However, it is planned to improve the analyser within the Task 3.2. With these improvements, the analyser should be able to assess more parameters. Also, some

work will be done to lower the limit of detection (LOD) for some pollutants in order to meet the specifications criteria for almost all the pollutants.

Even though we are confident to improve the analyser performances, it could not meet all the criteria by January 2017 (beginning of the pilot test). In consequence, an effort will also be done on the definition of indices for each use cases as it may not be needed to measure all the pollutant for every use case. The list of pollutants will be then adjusted for each use cases while we will develop the indicators and indices.

For example, in this study we already ruled out the TVOC as we explained that the TVOC concentration takes into account all the organic compounds with a chain containing between 6 and 12 carbon. However, some organic compounds with this criteria are not harmful so it will not have an impact on the occupants' health, and is then irrelevant to measure for the worker safety. We will conduct this type of analysis for each pollutant to build indices which are relevant.

Annex 1: Survey

Regulations for indoor air quality survey

Is there any national organism in your country responsible for the regulations redaction and the study of the IAQ? If yes, could you precise its name?

There is legislation (through the building codes) but no 'national organisation' especially for IAQ. There is the http://www.rivm.nl/Onderwerpen/B/Binnenmilieu/Binnenmilieu_in_woningen which is the national institute for public health and environment. IAQ testing can and is being performed by specialized companies. (Nieman for example)

Yes, we have one organism called I.S.S. = Istituto Superiore di Sanità.

BSI: British standards BS-ISO 1600 Building regulations Part F- Appendix A HSE: Contaminants at work

DEFRA: Air quality expert group Study: CIBSE, BREEAM assessments

Ausschuss für Innenraumrichtwerte (früher Ad-hoc-Arbeitsgruppe) des Umwelt Bundesamts

Is there any document presenting a study of the IAQ in your country? If yes, does it precise the relationship between IAQ and public health?

There are many studies, some of which being performed by TNO. To my knowledge this relationship is still under debate. There are threshold values for some pollutants.

In Italy there is no specific legislation at the national level for the control of indoor air quality in buildings. An interesting study published in E&P journal (see E&P - anno 38(6) novembre-dicembre 2014) present an overview of the IAQ assessment/standards approaches in EU and "what is proposed for Italy".

The Air quality expert group carried out a study titled "Fine Particulate Matter (2.5) in the U.K." but it has to do with external contaminants I do not know of any other studies. Most IAQ studies are carried out privately or by IAQ associations/ groups perhaps IAQuk.org?

<http://www.umweltbundesamt.de/themen/gesundheit/kommissionen-arbeitsgruppen/ausschuss-fuer-innenraumrichtwerte-vormals-ad-hoc> AkkP 23: Einfluss der Lüftungsstrategie auf die Schadstoffkonzentration und -ausbreitung im Raum; Passivhaus Institut 2003 W. Hässig et al: Gesundheitliche Aspekte der Komfortlüftung im Wohnbereich; Basler und Hofmann Ingenieure und Planer AG; Zürich 2003

What are the current regulations about IAQ in your country? What are the concentration limits for pollutants such as volatile organic compounds (VOC)(formaldehyde, toluene, acetaldehyde, tetrachloroethylene, xylene, styrene,...), small particulates, biocontaminants, ...?

Regulations in the building code on IAQ are primarily based on a minimum exchange rate (l/s of air being exchanged). the basis for this is not known to me, but if necessary we can give more information on this.

In Italy there is no specific legislation at the national level for the control of indoor air quality in residential buildings. Anyway technical standards have been published; here below the main list: - IAQ: UNI EN 15251:2008; UNI EN ISO 9169:2006; UNI EN ISO 16000-1:2006;... - IAQ in workplaces: UNI EN

13890:2009; UNI ISO/TR 27628:2010;... With regard to the workplace and for sensitive areas such as hospitals and so on, the situation about IAQ is more clear and mandatory regulations have been published and available (e.g. Legislative Decree of 9 April 2008, n. 81 concerning the "protection of health and safety in the workplace").

The concentration limits are shown in BS ISO 16000 for each contaminant, HSE for work and Building regulations for new builds (domestic and non-domestic)

<http://www.umweltbundesamt.de/themen/gesundheit/kommissionen-arbeitsgruppen/ausschuss-fuerinnenraumrichtwerte-vormals-ad-hoc>

http://www.umweltbundesamt.de/sites/default/files/medien/378/bilder/4_1.png referring to CO₂: EN 13779 (Indoor Air Classification)

Does it exist any standard(s) or common method(s) to assess IAQ or to measure materials pollutant emission?

My knowledge on this is very limited. If of importance we can maybe find someone with more expertise in this field.

At National level we don't have any indicator summarizing IAQ; but we measure and assess concentration of the main IAQ parameters based on EU guidelines and standards. E.g.: UNI EN 14884:2006; UNI 10169:2001.

BS EN 13986: 2002 : Emissions from wood Panels BS EN 14080 : 2005 Emissions from glued laminated timber BS EN 14342: 2005 Emissions from parquet flooring BS EN 14041: 2004: Emissions from vinyl, laminated and rubber floorings, linoleum and carpets BS EN 13964: 2004: Emissions from suspended ceiling tiles

What is the citizens' awareness to the IAQ matter? What is the position of the government about IAQ (regulations, laws, etc.)?

IAQ is of concern because of increasing energy performance regulations and therefore reduced ventilation rates. There are some (negative) examples of this which were in the media. Since then the awareness of this has increased. This has led to a (temporary?) decline of the popularity of system D ventilation systems. When inhabitants are aware of IAQ it is often because of complaints (draught, humidity, stale air)

For the majority still minimal but people awareness is growing. For the standard users may be not relevant aspects but "for front" environmental/building certifications (e.g. LEED, CasaClima, etc.) become a distinctive features. The government is still working in this issue but up to date no mandatory regulation has been delivered; only few recommendations/guidelines (see above) have been published.

Citizens' awareness: I do not know Government: IAQ has been introduced in Part L for new constructions German government (Umweltbundesamt) provides indicative values (see above)

Do you know new technologies emerging on the market assessing the IAQ? If yes, could you precise the company selling them?

CO₂ is the main IAQ parameter which is being measured in many cases. There are many CO₂ controlled ventilation systems available in the Netherlands. Other measurements are, to my knowledge, only for temporal specialist measurements.

A smart, portable and user-friendly device we bought for an estimation of the IAQ is the "Air Mentor - a 6-in-1 Indoor Air Quality Monitor" (<https://www.air-mentor.com/products>)

Annex 2: Concentration values threshold for professional long time exposure (mg/m³)

Pollutant \ Country	N° CAS	France	Germany	NL*	UK**	Italy	Hungary	Mexico	Estonia	Belgium	Argentina	Austria	Denmark	Spain	Ireland	USA	Australia	New Zealand	Switzerland	Canada
Formaldehyde	50-00-0	0.6	0.37	0.15	2.5	-	0.6	-	0.6	-	-	0.6	0.4	0.37	2.5	1	1.2	0.6	0.37	0.36
Benzene	71-43-2	3.25	1.9	3.25	3.25	3.25	3	3.2	1.5	3.25	1.6	3.2	1.6	3.25	3	25	3.2	3.2	1.6	1.6
Naphtalene	91-20-3	50	0.5	50	-	-	-	50	50	53	52	50	50	53	50	50	52	52	50	52
Trichloroethylene	79-01-6	405	60	-	550	-	270	535	50	273	268	33	55	273	54	536	54	269	260	54
Tetrachloroethylene	127-18-4	138	138	-	345	-	50	670	70	172	170	345	70	172	170	680	340	335	345	170
Acetaldehyde	75-07-0	180	91	37	37	-	25	-	45	46	-	90	45	-	45	360	36	36	90	-
Toluene	108-88-3	76.8	190	150	191	192	190	188	192	192	188	190	94	192	192	753	191	188	190	75
Xylene	95-47-6																			
	108-38-3	221	-	210	220	221	221	435	221	221	434	221	109	221	221	-	-	217	-	434
	106-42-3																			
Styrene	100-42-5	215	86	-	430	-	50	215	90	216	85	85	105	86	85	425	213	213	85	-
1,2,4-trimethylbenzene	95-63-6	100	100	100	125	100	-	-	100	-	-	100	100	100	100	-	-	-	-	-
1,4-dichlorobenzene	106-46-7	4.5	6	150	153	122	122	450	122	61	60	122	60	122	122	450	150	153	122	60
Ethylbenzene	100-41-4	88.4	88	215	441	442	442	435	442	442	434	440	217	441	442	435	434	434	220	87
2-butoxyethanol	111-76-2	49	49	100	123	98	98	120	98	98	97	98	98	98	98	240	97	121	49	97
Acrolein	107-02-8	-	0.2	-	0.23	-	0.23	0.25	0.2	0.23	-	0.25	0.12	0.23	0.25	0.25	0.23	0.23	0.25	-
α-pinene	80-56-8	-	-	-	-	-	-	-	150	111	-	-	-	-	-	-	-	-	-	111
Limonene	5989-27-5																			
	5989-54-8	-	-	-	-	-	-	-	-	-	-	-	390	-	-	-	-	-	40	-
	138-86-3																			
Hexanal	66-25-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
delta-3-carene	13466-78-9	-	-	-	-	-	-	-	150	111	-	-	-	-	-	-	-	-	-	111
TVOC		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NO ₂	10102-44-0	-	-	0.4	-	-	9	6	4	5.7	5.6	6	4	5.7	5	30	5.6	5.6	6	-
CO	630-08-0	55	-	29	35	-	33	55	40	29	29	33	29	29	23	9	34	27	35	29
PM 2.5	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PM10	-	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05	-	-	-	-

* Netherlands

**United Kingdom

Annex 3: Concentration values threshold for professional short time exposure (mg/m³)

Pollutant \ Country	N° CAS	France	NL*	UK**	Italy	Hungary	Mexico	Estonia	Belgium	Argentina	Austria	Spain	Ireland	USA	Australia	New Zeland	Switzerland	Canada
Formaldehyde	50-00-0	1.2	0.5	2.5	-	0.6	3	1.2	0.38	0.4	0.6	-	2.5	2.5	2.5	1.2	0.74	1.2
Benzene	71-43-2	-	-	-	-	-	16	9	-	8	12.8	-	-	-	-	8	-	8
Naphtalene	91-20-3	-	80	-	-	-	75	-	80	79	-	80	75	-	79	79	-	79
Trichloroethylene	79-01-6	108	-	820	-	540	1080	140	545	536	132	-	134	1072	216	1070	520	134
Tetrachloroethylene	127-18-4	275	-	689	-	50	1340	170	695	679	1380	689	678	1360	1020	1005	690	679
Acetaldehyde	75-07-0	-	92	92	-	25	45	90	-	45	90	46	45	-	91	90	90	45
Toluene	108-88-3	384	384	384	-	380	-	384	384	-	380	384	384	1129	574	-	760	-
Xylene	95-47-6 108-38-3 106-42-3	442	442	441	442	442	635	442	442	650	442	442	442	-	-	-	-	650
Styrene	100-42-5	-	-	1080	-	50	425	200	432	170	340	172	170	851	426	426	170	-
1,2,4-trimethylbenzene	95-63-6	250	200	-	-	100	-	-	-	-	150	-	-	-	-	-	-	-
1,4-dichlorobenzene	106-46-7	306	300	306	300	306	675	306	306	-	306	306	306	-	300	306	-	-
Ethylbenzene	100-41-4	442	430	552	884	884	545	884	551	542	880	884	884	-	543	543	220	-
2-butoxyethanol	111-76-2	246	246	246	246	246	360	246	246	-	200	245	246	-	242	-	98	-
Acrolein	107-02-8	0.25	-	0.7	-	0.23	0.8	0.7	0.7	0.2	0.25	0.69	0.8	-	0.69	-	0.25	0.23
α-pinene	80-56-8	-	-	-	-	-	-	300	-	-	-	-	-	-	-	-	-	-
Limonene	5989-27-5 5989-54-8 138-86-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80	-
Hexanal	66-25-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
delta-3-carene	13466-78-9	-	-	-	-	-	-	300	-	-	-	-	-	-	-	-	-	-
TVOC		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NO ₂	10102-44-0	6	1	-	-	9	10	10	9.5	9.4	12	9.6	9	-	9.4	9.4	6	1.9
CO	630-08-0	100	-	232	-	66	400	120	-	-	66	-	115	35	-	230	70	115
PM 2.5	-	0.025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PM10	-	0.05	-	-	-	-	-	-	-	-	-	-	-	0.15	-	-	-	-

* Netherlands

**United Kingdom

Annex 4: Guidelines concentrations values threshold for short time and longtime exposure ($\mu\text{g}/\text{m}^3$)

Pollutant	Organization N° CAS	Netherlands		Germany (AGOEF)		WHO		Europe		ANSES (France)		Etiquetage A+
		Long time	Short time	Long time	Short time	Long time	Short time	Long time	Short time	Long time		
Formaldehyde	50-00-0	0.0012	100	30	100 (30min)	-	30 (30min)	-	50 (2h)	10	10	
Benzene	71-43-2	0.02	-	-	-	1.7	-	As low as possible	30 (1-14 days)	2	-	
Naphtalene	91-20-3	0.025	30	10	-	10	-	10	-	10	-	
Trichloroethylene	79-01-6	0.2	-	-	-	23	-	-	800	20	-	
Tetrachloroethylene	127-18-4	0.25	-	-	-	250	-	-	1 380 (1-14 days)	250	250	
Acetaldehyde	75-07-0	-	1	100	-	-	200	200	3000 (1h)	160	200	
Toluene	108-88-3	-	3	300	-	-	15 000	300	-	-	300	
Xylene	95-47-6 108-38-3 106-42-3	0.87	60	20	-	-	-	200	-	-	200	
Styrene	100-42-5	0.9	300	30	-	-	2000	250	-	-	200	
1,2,4-trimethylbenzene	95-63-6	-	1 000	100	-	-	-	-	-	-	1 000	
1,4-dichlorobenzene	106-46-7	0.67	-	-	-	-	-	-	-	-	60	
Ethylbenzene	100-41-4	0.77	2 000	200	-	-	-	-	-	-	750	
2-butoxyethanol	111-76-2	-	1 000	100	-	-	-	-	-	-	1000	
Acrolein	107-02-8	-	-	-	-	-	-	-	6.9 (1h)	0.8	-	
α -pinene	80-56-8	-	2 000	200	-	-	-	-	-	-	-	
Limonene	5989-27-5 5989-54-8 138-86-3	-	10 000	1 000	-	-	-	-	-	-	-	
Hexanal	66-25-1	-	2 000	100	-	-	-	-	-	-	-	
delta-3-carene	13466-78-9	-	2 000	200	-	-	-	-	-	-	-	
TVOC		-	-	-	-	-	-	-	-	-	1 000	
NO ₂	10102-44-0	0.2	350	60	200 (1h)	40 (1year)	200 (1h)	40	200 (1h)	20	-	
CO	630-08-0	10	-	-	100 000 (15min)	7 000 (24h)	30 000 (1h)	10 000 (8h)	100 000 (15min)	10 000 (8h)	-	
PM 2.5	-	0.024	-	-	25	10	-	-	25	10	-	
PM10	-	0.05	-	-	50	20	-	-	50	20	-	

Annex 5: Occupational Exposure Limits in France, Germany, Ireland, Italy, Netherlands, Spain and the UK

➤ France⁸⁷

VALEURS LIMITES D'EXPOSITION PROFESSIONNELLE INDICATIVES

DÉNOMINATION	NUMÉRO CE (1)	NUMÉRO CAS (2)	VALEUR LIMITE D'EXPOSITION PROFESSIONNELLE				OBSERVATIONS
			8 heures (3)		Court terme (4)		
			mg/m ³ (5)	ppm (6)	mg/m ³	ppm	
Acétate de 3-pentyle		620-11-1	270	50	540	100	-
Acide bromhydrique	233-113-0	10035-10-6	-	-	6,7	2	-
Acide formique	200-579-1	64-18-6	9	5	-	-	-
Acide nitrique	231-714-2	7697-37-2	-	-	2,6	1	-
Acide phosphorique	231-633-2	7664-38-2	1	0,2	2	0,5	-
Acide propionique	201-176-3	79-09-4	31	10	62	20	-
Acide oxalique	205-634-3	144-62-7	1	-	-	-	-
Acide sulfurique (fraction thoracique)	231-639-5	7664-93-9	0,05			-	
Acrylate de n-butyle	205-480-7	141-32-2	11	2	53	10	-
Alcool allylique	203-470-7	107-18-6	0,48	0,2	4,8	2	Peau (7)
Amylacétate, tert		625-16-1	270	50	540	100	-
Argent (composés solubles en Ag)	231-131-3	-	0,01	-	-	-	-
Argent métallique	231-131-3	7440-22-4	0,1	-	-	-	-
Baryum (composés solubles)	-	-	0,5	-	-	-	-
2-(2-butoxyéthoxy)éthanol	203-961-6	112-34-5	67,5	10	101,2	15	-
e-caprolactame (poudre et vapeur)	203-313-2	105-60-2	10	-	40	-	-
Chlorodifluorométhane	200-871-9	75-45-6	3600	1000	-	-	-
Chloroéthane	200-830-5	75-00-3	268	100	-	-	-
Cyanamide	206-992-3	420-04-2	1	0,58	-	-	Peau (7)
1,4-dichlorobenzène	203-400-5	106-46-7	4,5	0,75	306	50	-
1,1-dichloroéthane	200-863-5	75-34-3	412	100	-	-	Peau (7)
Dioxyde de carbone	204-696-9	124-38-9	9 000	5 000	-	-	-

⁸⁷ Le ministère de l'emploi, du travail et de la cohésion sociale et le ministère de l'agriculture, de l'alimentation, de la pêche et des affaires rurales, **2004**, Arrêté du 30 juin 2004 établissant la liste des valeurs limites d'exposition professionnelle indicatives en application de l'article R. 23255 du code du travail

DÉNOMINATION	NUMÉRO CE (1)	NUMÉRO CAS (2)	VALEUR LIMITE D'EXPOSITION PROFESSIONNELLE				OBSERVATIONS
			8 heures (3)		Court terme (4)		
			mg/m3 (5)	ppm (6)	mg/m3	ppm	
Ethylène-glycol	203-473-3	107-21-1	52	20	104	40	Peau (7)
Fluor	231-954-8	7782-41-4	1,58	1	3,16	2	-
Fluorures inorganiques			2,5	-	-	-	-
Isopentane	201-142-8	78-78-4	3 000	1 000	-	-	-
Métal chrome, composés de chrome inorganiques (II) et composés de chrome inorganiques (insolubles) (III)	-	-	2	-	-	-	-
Mésitylène (triméthylbenzènes)	203-604-4	108-67-8	100	20	-	-	-
2-(2-méthoxyethoxy)éthanol	203-906-6	111-77-3	50,1	10	-	-	Peau (7)
5-méthylhexane-2-one	203-737-8	110-12-3	95	20	475	100	Peau (7)
5-méthylheptane-3-one	208-793-7	541-85-5	53	10	107	20	-
N-méthyle-2-pyrrolidone	212-828-1	872-50-4	40	10	80	20	Peau (7)
Néopentane	207-343-7	463-82-1	3 000	1 000	-	-	-
Nicotine	200-193-3	54-11-5	0,5	-	-	-	Peau (7)
Nitrobenzène	202-716-0	98-95-3	1	0,2	-	-	Peau (7)
Oxyde de diméthyle	204-065-8	115-10-6	1920	1000	-	-	-
Pentaoxyde de disphosphore	215-236-1	1314-56-3	1	-	-	-	-
Pentasulfure de disphosphore	215-242-4	1314-80-3	1	-	-	-	-
2-phénylpropène	202-705-0	98-83-9	123	25	492	100	Peau (7)
Phosphine	232-260-8	7803-51-2	-	-	0,28	0,2	-
Pipérazine (poudre et vapeur)	203-808-3	110-85-0	0,1	-	0,3	-	-

DÉNOMINATION	NUMÉRO CE (1)	NUMÉRO CAS (2)	VALEUR LIMITE D'EXPOSITION PROFESSIONNELLE				OBSERVATIONS
			8 heures (3)		Court terme (4)		
			mg/m ³ (5)	ppm (6)	mg/m ³	ppm	
Pyrèthre (après suppression des lactones sensibilisantes)	-	8003-34-7	1	-	-	-	-
Résorcinol	203-585-2	108-46-3	45	10	-	-	Peau (7)
Séléniure de dihydrogène	231-978-9	7783-07-5	0,07	0,02	0,17	0,05	-

(1) Inventaire européen des substances chimiques existantes (EINECS).
 (2) Numéro du Chemical Abstract Service (American Chemical Society).
 (3) Mesurée ou calculée par rapport à une période de référence de 8 heures, moyenne pondérée dans le temps.
 (4) Valeur limite au-dessus de laquelle il ne devrait pas y avoir d'exposition et qui se rapporte à une période de quinze minutes sauf indication contraire.
 (5) mg/m³ : milligrammes par mètre cube d'air à 20 oC et 101,3 kPa (760 mm de mercure).
 (6) ppm : partie par million en volume dans l'air (ml/m³).
 (7) La mention "peau" accompagnant la limite d'exposition professionnelle indique la possibilité d'une pénétration cutanée importante.

➤ Germany⁸⁸

Substance	Acceptable concentration			Tolerable concentration			Remarks
	Vol-conc.	Mass conc.	Notes ⁷⁾	Vol-conc.	Mass conc.	EF ⁷⁾	
Acrylamide		0.07 mg/m ³	b)		0.15 mg/m ³	8	(1), (2)
Acrylonitrile	0.12 ppm	0.26 mg/m ³	b)	1.2 ppm	2.6 mg/m ³	8	H
Aluminium silicate fibres		10,000 fibres/m ³	b), d)		100,000 fibres/m ³	8	See also TRGS 558
Arsenic compounds, classified as C1A, C1B		0.83 µg/m ³ (E)	b)		8.3 µg/m ³ (E)	8	See also TRGS Metals (in preparation)
Asbestos		10,000 fibres/m ³	b)		100000 fibres/m ³	8	See also TRGS 517, 519
Benzene	0.06 ppm	0.2 mg/m ³	b)	0.6 ppm	1.9 mg/m ³	8	H
Benzo(a)pyrene in certain PAH compounds		70 ng/m ³ (E)	b)		700 ng/m ³ (E)	8	See TRGS 551 (under revision)
1,3-Butadiene	0.2 ppm	0.5 mg/m ³	b)	2 ppm	5 mg/m ³	8	
Cadmium and Cd compounds, classed as C1A, C1B		0.16 µg/m ³ (A)	b)		1 µg/m ³ (E)	8	See also TRGS Metals (in preparation)
Hexavalent chromium							See TRGS Metals (in preparation)
Dimethylnitrosoamin		0,075 µg/m ³	b)		0,75 µg/m ³	8	See also TRGS 552 (under revision)
Epichlorohydrin	0.6 ppm	2.3 mg/m ³	b)	2 ppm	8 mg/m ³	2	(2)
Ethylene oxide	0.1 ppm	0.2 mg/m ³	b), e)	1 ppm	2 mg/m ³	2	See also TRGS 513
Hydrazine	1.7 ppb	2.2 µg/m ³	b)	17 ppb	22 µg/m ³	2	
4,4'- Methylene dianiline		70 µg/m ³	b)		700 µg/m ³	8	(1)
Trichloroethene	6 ppm	33 mg/m ³	b)	11 ppm	60 mg/m ³	8	

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.	Bemerkungen	Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungsfaktor		
Acetaldehyd	200-836-8	75-07-0	50	91	1;-2=(I)	AGS, DFG, Y	01/10
Aceton	200-662-2	67-64-1	500	1200	2(I)	AGS, DFG, EU, Y	02/15
Acetonitril	200-835-2	75-05-8	20	34	2(II)	DFG, EU, H, Y	01/06
Acrylaldehyd	203-453-4	107-02-8	0,09	0,2	2(I)	AGS, H	04/07
Acrylsäure	201-177-9	79-10-7	10	30	1(I)	DFG, Y	04/07
Aldrin (ISO)	206-215-8	309-00-2		0,25 E	8(II)	DFG, H	01/06
Allgemeiner Staubgrenzwert (siehe auch Nummer 2.4) Alveolengängige Fraktion Einatembare Fraktion				1,25 A 10 E	2(II)	AGS, DFG	02/14
Allylalkohol	203-470-7	107-18-6	2	4,8	2,5(I)	EU, H	01/06
1-(2-(Allyloxy)-2-(2,4-dichlorphenyl)ethyl)-1H-imidazol (Imazalil)	252-615-0	35554-44-0		2 E	2 (II)	H, Y, DFG	09/14
Allylpropyldisulfid	218-550-7	2179-59-1	2	12	1(I)	DFG	01/06
Ameisensäure	200-579-1	64-18-6	5	9,5	2(I)	DFG, EU, Y	01/06
2-Amino-ethanol	205-483-3	141-43-5	2	5,1	2(I)	DFG, EU, H, Y, Sh, 11	07/13
2-(2-Aminoethoxy)ethanol (Diglykolamin)	213-195-4	929-06-6	0,2	0,87	1(I)	DFG, H, Sh, 11	02/15

⁸⁸ Bundesministerium für Arbeit und Soziales, 2006, Technische Regeln für Gefahrstoffe, Arbeitsplatzgrenzwerte, TRGS 900 and TGRS 910; Available at: <http://www.baua.de/de/Themen-von-A-Z/Gefahrstoffe/TRGS/TRGS-900.html>

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.		Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs-faktor	Bemerkungen	Monat/ Jahr
2-Amino-2-methyl-1-propanol (AMP)	204-709-8	124-68-5	1	3,7	2 (II)	DFG, H, Y, 11	09/15
2-Aminonaphthalin-1-sulfonsäure	201-331-5	81-16-3		6 E	4(II)	AGS	01/06
N-(4-Aminophenyl)anilin	202-951-9	101-54-2	0,91	7 E	2 (II)	H, Sh, Y, AGS	09/14
2-Aminopropan	200-860-9	75-31-0	5	12	=2=(I)	DFG, Y	05/09
1-Aminopropan-2-ol (MIPA)	201-162-7	78-96-6	2	5,8	2 (I)	AGS, 11	07/13
Amitrol (ISO)	200-521-5	61-82-5		0,2 E	8(II)	DFG, Y, H	07/13
Ammoniak	231-635-3	7664-41-7	20	14	2(I)	DFG, EU, Y	12/07
Anilin	200-539-3	62-53-3	2	7,7	2(II)	DFG, H, Y, Sh, 11	07/13
Arsin	232-066-3	7784-42-1	0,005	0,016	8(II)	AGS	04/07
Atrazin (ISO)	217-617-8	1912-24-9		1 E	2 (II)	DFG, Y	07/13
Azinphos-methyl (ISO)	201-676-1	86-50-0		0,2 E	8(II)	DFG, H	01/06
Bariumverbindungen, löslich (außer Bariumoxid und Bariumhydroxid)				0,5 E	1(I)	EU, 13, 10, 15	12/07
Baumwollstaub				1,5 E	1(I)	DFG, 4, Y	01/06
Benzothiazol-2-thiol	205-736-8	149-30-4		4 E		DFG, Y	01/06
Benzol-1,2,4-tricarbonsäure-1,2-anhydrid (Rauch)	209-008-0	552-30-7		0,04 A	1(I)	DFG, Sa	12/07
Bis(2-ethylhexyl)phthalat (Diethylhexylphthalat, DEHP)	204-211-0	117-81-7		2 E	2(II)	DFG, H, Y	09/15
2,5-(und 2,6-)Bis(isocyanatomethyl)- bicyclo[2.2.1]heptan	411-280-2		0,005	0,045		AGS	04/07
Bis(2-methoxyethyl)ether	203-924-4	111-96-6	5	28	8(II)	DFG, H, Z	01/06
Bisphenol A	201-245-8	80-05-7		5 E	1(I)	DFG, EU, Y	01/06
Borsäure und Natriumborate	233-139-2	10043-35-3		0,5 E	2 (I)	AGS, Y, 10	09/15
Bortrifluorid	231-569-5	7637-07-2	0,35	1	2 (II)	AGS, Y	04/07
Bortrifluorid-Dihydrat	231-569-5	13319-75-0	0,35	1,5	2 (II)	AGS, Y	05/08
Brommethan	200-813-2	74-83-9	1	3,9	2 (I)	DFG	07/13
Bromtrifluormethan (R 13 B1)	200-887-6	75-63-8	1000	6200	8(II)	DFG, Y	01/06
Brom	231-778-1	7726-95-6		0,7	1(I)	EU; AGS	12/07
Butan	203-448-7	106-97-8	1000	2400	4(II)	DFG	01/06
Butan-1,4-diol	203-786-5	110-63-4	50	200	4(II)	AGS, 11	07/13
Butandion (Diacetyl)	207-069-8	431-03-8	0,02	0,071	1(III)	DFG, H, Sh, Y	09/15
Butan-1-ol	200-751-6	71-36-3	100	310	1(I)	DFG, Y	01/06
Butanon	201-159-0	78-93-3	200	600	1(I)	DFG, EU, H, Y	01/06
Butanonoxim	202-496-6	96-29-7	0,3	1	8 (I)	AGS, Y, H, Sh	07/13
Butan-1-thiol	203-705-3	109-79-5	0,5	1,9	2(II)	DFG, Y	01/06
But-2-in-1,4-diol	203-788-6	110-65-6	0,1	0,36	1(I)	DFG, Sh, H, Y, 11	07/13
2-Butoxyethanol	203-905-0	111-76-2	10	49	4(II)	H, Y, AGS	12/11
2-(2-Butoxyethoxy)ethanol	203-961-6	112-34-5	10	67	1,5 (I)	EU, DFG, Y, 11	07/13
2-(2-Butoxyethoxy)ethylacetat	204-685-9	124-17-4	10	67	1,5 (I)	DFG, Y, 11	07/13
2-Butoxyethyl-acetat	203-933-3	112-07-2	20	130	4(II)	DFG, EU, H, Y, 11	07/13
n-Butylacetat	204-658-1	123-86-4	62	300	2 (I)	AGS, Y	07/12
sec-Butylacetat	203-300-1	105-46-4	62	300	2 (I)	AGS, Y	07/12
tert-Butylacetat	208-760-7	540-88-5	42	200	2 (II)	AGS, Y	07/12

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.		Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs-faktor	Bemerkungen	Monat/Jahr
n-Butylacrylat	205-480-7	141-32-2	2	11	2(I)	DFG, EU, Y	05/09
4-tert-Butylbenzoesäure	202-696-3	98-73-7		2 E	2(II)	DFG, H	01/06
Butylchlorformiat	209-750-5	592-34-7	0,2	1,1	2(I)	DFG, Y	01/06
2,6-Di-tert-butyl-p-kresol	204-881-4	128-37-0		10 E	4 (II)	DFG, Y, 11	07/13

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.		Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs-faktor	Bemerkungen	Monat/Jahr
tert-Butyl-4-methoxyphenol	246-563-8	25013-16-5		20 E	1 (II)	DFG,Y, 11	07/13
(tert-Butyl)methylether	216-653-1	1634-04-4	50	180	1,5(I)	DFG, EU, Y	01/06
4-tert-Butylphenol	202-679-0	98-54-4	0,08	0,5	2(II)	DFG, H, 11	07/13
Butyraldehyd	204-646-6	123-72-8	20	64	1(I)	AGS	01/06
Calciumcyanamid	205-861-8	156-62-7		1 E	2(II)	DFG, H, Y	07/12
Calciumdihydroxid	215-137-3	1305-62-0		1 E	2 (I)	Y, EU, DFG	09/14
Calciumoxid	215-138-9	1305-78-8		1 E	2 (I)	Y, DFG	09/14
Calciumsulfat	231-900-3	7778-18-9		6 A		DFG	01/06
ε-Caprolactam (Dampf und Staub)	203-313-2	105-60-2		5 E	2(I)	DFG, EU, Y, 11	07/13
Carbaryl (ISO)	200-555-0	63-25-2		5 E	4(II)	DFG, H	01/06
Carbendazim	234-232-0	10605-21-7		10 E	4 (II)	DFG, Z	07/13
Chlor	231-959-5	7782-50-5	0,5	1,5	1(I)	DFG, EU, Y	01/06
Chloralkane, C ₁₄₋₁₇ (Chlorierte Paraffine C ₁₄₋₁₇)	287-477-0	85535-85-9	0,3 E	6 E	8(II)	H, Y, 11, AGS	11/11
Chlorbenzol	203-628-5	108-90-7	10	47	2(II)	DFG, EU, Y	01/06
1-Chlorbutan	203-696-6	109-69-3	25	95,5	1(I)	AGS	01/06

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.		Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs-faktor	Bemerkungen	Monat/Jahr
Chlordan (ISO)	200-349-0	57-74-9		0,5 E	8(II)	DFG, H	01/06
1-Chlor-1,1-difluorethan (R 142 b)	200-891-8	75-68-3	1000	4200	8(II)	DFG	01/06
Chlordifluormethan (R 22)	200-871-9	75-45-6		3600		EU, 9	01/06
Chlordioxid	233-162-8	10049-04-4	0,1	0,28	1(I)	DFG	01/06
Chloressigsäure	201-178-4	79-11-8	1	4	1(I)	AGS, H, 11	07/13
Chlorethan	200-830-5	75-00-3	40	110	2(II)	AGS, EU	12/07
2-Chlor-ethanol	203-459-7	107-07-3	1	3,3	1(II)	DFG, H, Y	01/06
Chlormethan	200-817-4	74-87-3	50	100	2(II)	DFG, H, Z	01/06
3-Chlor-1,2-propandiol	202-492-4	96-24-2	0,005	0,023	8 (II)	H, 11, DFG	02/14
Chlorpyriphos (ISO)	220-864-4	2921-88-2		0,2		NL-Experten, H	01/06
Chlortrifluormethan (R 13)	200-894-4	75-72-9	1000	4300	8(II)	DFG	01/06
Chrom und anorganische Chrom(II) und (III)-Verbindungen	231-157-5	7440-47-3		2 E	1(I)	10, EU	12/07
Cryofluoran (R 114)	200-937-7	76-14-2	1000	7100	8(II)	DFG	01/06
Cumol	202-704-5	98-82-8	10	50	4 (II)	H, Y,AGS, EU, DFG	09/14
Cyanamid	206-992-3	420-04-2	0,2	0,35 E	1(II)	DFG,H, Sh, Y, 11, EU	07/13

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.		Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs-faktor	Bemerkungen	Monat/ Jahr
alpha-Cyan-4-fluor-3-phenoxybenzyl-3-(2,2-dichlorvinyl)-2,2-dimethylcyclopropanocarboxylat (Cyfluthrin)	269-855-7	68359-37-5		0,01 E	1(I)	DFG, Y	01/06
Cyclohexan	203-806-2	110-82-7	200	700	4(II)	DFG, EU	01/06
Cyclohexanon	203-631-1	108-94-1	20	80	1(I)	AGS, EU, H, Y	01/06
Cyclohexylamin	203-629-0	108-91-8	2	8,2	2 (I)	DFG, Y	07/13
N-Cyclohexylhydroxydiazin-1-oxid, Kaliumsalz		66603-10-9		10 E	2 (II)	H, DFG	09/14
Decaboran	241-711-8	17702-41-9	0,05	0,25	2(II)	DFG, H	01/06
Decahydronaphthalin (Decalin)	202-046-9	91-17-8	5	29	2(II)	DFG, 11	09/15
Demeton		8065-48-3	0,01	0,1		NL-Experten, H	01/06
Demetonmethyl		8022-00-2	0,5	4,8	2(II)	DFG, H	01/06
Diazinon (ISO)	206-373-8	333-41-5		0,1 E	2(II)	DFG, H, Y	01/06
Dibasische Ester (DBE) (Gemische aus Dimethyladipat, Dimethylglutarat und Dimethylsuccinat)			1,2	8	2 (I)	AGS, Y	03/11
Dibenzoylperoxid	202-327-6	94-36-0		5 E	1(I)	DFG	01/06
Dibutylphthalat	201-557-4	84-74-2	0,05	0,58	2 (I)	DFG, Y, 11	07/13
Di-n-butylamin	203-921-8	111-92-2	5	29	1(I)	AGS, H, 6	01/06
1,2-Dichlorbenzol	202-425-9	95-50-1	10	61	2(II)	DFG, EU, H, Y	01/06
1,3-Dichlorbenzol	208-792-1	541-73-1	2	12	2(II)	AGS, Y	05/2010
1,4-Dichlorbenzol	203-400-5	106-46-7	1	6	2(II)	AGS, EU, Y	02/09
2,2'-Dichlor-diethylether	203-870-1	111-44-4	10	59	1(I)	DFG, H	01/06
Dichlordifluormethan (R 12)	200-893-9	75-71-8	1000	5000	2(II)	DFG, Y	01/06
1,1-Dichlorethan	200-863-5	75-34-3	100	410	2(II)	DFG, EU, Y	05/09
1,1-Dichlorethen	200-864-0	75-35-4	2	8	2(II)	DFG, Y	01/06
1,2-Dichlorethylen sym. (cis-[2058597, 156-59-2] und trans-[2058602, 156-60-5])	208-750-2	540-59-0	200	800	2(II)	DFG	01/06
Dichlorfluormethan (R 21)	200-869-8	75-43-4	10	43	2(II)	DFG	01/06
Dichlormethan	200-838-9	75-09-2	50	180	2 (II)	DFG, H, Z	09/15
Dichlormethylbenzol (Isomeregemisch, ringsubstituiert)	249-854-8	29797-40-8	5	30	4(II)	AGS, H	01/06
2,4-Dichlortoluol	202-445-8	95-73-8	5	30	4(II)	AGS, H	01/06
Dichlorvos (ISO)	200-547-7	62-73-7	0,11	1	2(II)	DFG, H, Y	01/06
Dicyclohexylamin	202-980-7	101-83-7	0,7	5	2 (II)	AGS, H, Y, 11	07/13
Dimethylether	204-065-8	115-10-6	1000	1900	8(II)	DFG, EU	01/06
N,N-Dimethylformamid	200-679-5	68-12-2	5	15	2(II)	EU, DFG, AGS, H, Z	11/11
Dimethylglutarat	214-277-2	1119-40-0	1,2	8	2 (I)	AGS, Y, 11	07/13
N,N-Dimethylisopropylamin	213-635-5	996-35-0	1	3,6	2(I)	DFG	01/06
Dimethylpropan	207-343-7	463-82-1	1000	3000	2(II)	DFG, EU	01/06
1,1-Dimethylpropylacetat		625-16-1	50	270	1(I)	DFG, EU	01/06
Dimethylsuccinat	203-419-9	106-65-0	1,2	8	2 (I)	AGS, Y, 11	07/13
1,4-Dioxan	204-661-8	123-91-1	20	73	2(I)	DFG, EU, H, Y	05/09

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.		Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs-faktor	Bemerkungen	Monat/ Jahr
Diphenylamin	204-539-4	122-39-4		5 E	2 (II)	DFG, Y, H	07/13
Diphenylether (Dampf)	202-981-2	101-84-8	1	7,1	1(I)	DFG, Y, 11	07/13
Diphosphorpentasulfid	215-242-4	1314-80-3		1	4(I)	EU, 13	12/07
Distickstoffoxid	233-032-0	10024-97-2	100	180	2(II)	DFG, Y	05/09
Disulfiram	202-607-8	97-77-8		2 E	8(II)	DFG, 6	01/06
Dodecan-1-ol (Langkettige Alkohole)	203-982-0	112-53-8	20	155	1(I)	AGS, 11	07/13
Endrin (ISO)	200-775-7	72-20-8		0,05 E	8(II)	DFG, H, Y	07/12
Enfluran	237-553-4	13838-16-9	20	150	8(II)	DFG, Y	01/06
1,2-Epoxybutan (1,2-Butylenoxid)	203-438-2	106-88-7	1	3	2(I)	AGS, Y, H, X	09/15
Essigsäure	200-580-7	64-19-7	10	25	2(I)	DFG, EU, Y	12/07
Essigsäureanhydrid	203-564-8	108-24-7	5	21	1(I)	DFG	01/06
Ethandiol	203-473-3	107-21-1	10	26	2(I)	DFG, EU, H, Y, 11	07/13
Ethanol	200-578-6	64-17-5	500	960	2(II)	DFG, Y	01/06
Ethanthiol	200-837-3	75-08-1	0,5	1,3	2(II)	DFG	01/06
2-Ethoxyethanol	203-804-1	110-80-5	2	7,6	8 (II)	EU, DFG, H, Z	03/11
2-(2-Ethoxyethoxy)ethanol	203-919-7	111-90-0	6	35	2(I)	AGS, Y, 11	07/13
2-Ethoxyethylacetat	203-839-2	111-15-9	2	10,8	8 (II)	EU, DFG, H, Z	03/11
2-Ethoxy-1-methylethylacetat	259-370-9	54839-24-6	50	300	2(II)	DFG, Y, 14	04/07
1-Ethoxypropan-2-ol	216-374-5	1569-02-4	50	220	2(II)	DFG, H, Y, 14	04/07
Ethylacetat	205-500-4	141-78-6	400	1500	2(I)	DFG, Y	01/06
Ethylacrylat	205-438-8	140-88-5	5	21	2(I)	DFG, EU, H, Y	05/09
Ethylamin	200-834-7	75-04-7	5	9,4	=2=(I)	DFG, EU	01/06
Ethylbenzol	202-849-4	100-41-4	20	88	2(II)	DFG, H, Y, EU	07/12
Ethyl-chloracetat	203-294-0	105-39-5	1	5	1(I)	AGS, H	01/06
2,2'-(Ethylendioxy)diethanol (Triethylenglykol)	203-953-2	112-27-6		1000 E	2(II)	DFG, Y, 11	07/13
Ethyl-3-ethoxypropionat	212-112-9	763-69-9	100	610	1(I)	AGS, DFG, H, Y	04/07
Ethylformiat	203-721-0	109-94-4	100	310	1(I)	DFG, H, Y	01/06
2-Ethylhexan-1-ol	203-234-3	104-76-7	10	54	1(I)	DFG, Y, 11	02/15
2-Ethylhexylacetat	203-079-1	103-09-3	10	71	1(I)	DFG, Y, 11	02/15
2-Ethylhexylacrylat	203-080-7	103-11-7	5	38	1(I)	DFG, Sh, Y, 11	07/13
O-Ethyl-O-4-nitrophenylphenylthiophosphonat	218-276-8	2104-64-5		0,5 E	2(II)	DFG, H	01/06
Fenthion (ISO)	200-231-9	55-38-9		0,2 E	2(III)	DFG, H	01/06
Fluor	231-954-8	7782-41-4	1	1,6	2(I)	EU, 13	12/07
Fluoride (als Fluor berechnet)		16984-48-8		1 E	4(II)	DFG, Y, H	12/07
Fluorwasserstoff	231-634-8	7664-39-3	1	0,83	2(I)	DFG, EU, Y, H	12/07
Formaldehyd	200-001-8	50-00-0	0,3	0,37	2(I)	AGS, Sh, Y, X	02/15

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.		Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs-faktor	Bemerkungen	Monat/ Jahr
Glutaral	203-856-5	111-30-8	0,05	0,2	2(I)	AGS, Sah, Y	05/2010
Glycerintrinitrat	200-240-8	55-63-0	0,01	0,094	1 (II)	H, Y, DFG	12/11
Glykoldinitrat	211-063-0	628-96-6	0,05	0,32	1(II)	DFG, H, 7, 11	07/13
Halothan	205-796-5	151-67-7	5	41	8(II)	DFG, Z	01/06
Heptachlor (ISO)	200-962-3	76-44-8		0,05 E	8(II)	H, AGS, DFG	12/11
Heptan (alle Isomeren)			500	2100	1(I)	DFG	01/06
Heptan-2-on	203-767-1	110-43-0		238	2(I)	EU, H	01/06
Heptan-3-on	203-388-1	106-35-4	10	47	2(I)	DFG, EU	01/06
Hexachlorcyclopentadien	201-029-3	77-47-4	0,02	0,2		AGS, 11	07/13
Hexachlorethan	200-666-4	67-72-1	1	9,8	2(II)	DFG, 11	07/13
Hexadecan-1-ol (Langkettige Alkohole)	253-149-0	36653-82-4	20	200	1(I)	AGS, 11	07/13
Hexamethylen-1,6-diisocyanat	212-485-8	822-06-0	0,005	0,035	1;=2=(I)	DFG, 11, 12, Sa	07/13
Hexamethylenbis(3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionat)	252-346-9	35074-77-2		10 E	2 (II)	DFG, Y	07/12
n-Hexan	203-777-6	110-54-3	50	180	8(II)	DFG, EU, Y	01/06
Hexan Isomere (außer n-Hexan) und Methylcyclopentan			500	1800	2(II)	DFG	5/2010
1-Hexanol (Langkettige Alkohole)	203-852-3	111-27-3	50	210	1(I)	AGS, 11	07/13
Hexan-2-on	209-731-1	591-78-6	5	21	8(II)	DFG, H	01/06
2-Hexyldecan-1-ol (Langkettige Alkohole)	219-370-1	2425-77-6	20	200	1(I)	AGS	01/06
Hydrogenazid	231-965-8	7782-79-8	0,1	0,18	2(I)	DFG	01/06
Hydrogenbromid	233-113-0	10035-10-6		6,7	1(I)	DFG, EU, 13	12/07
Hydrogenchlorid	231-595-7	7647-01-0	2	3	2(I)	DFG, EU, Y	01/06
Hydrogensulfid	231-977-3	7783-06-4	5	7,1	2(I)	EU, DFG, AGS, Y	03/11
2-(2-(2-Hydroxyethoxy)-ethyl)-2-aza-bicyclo[2.2.1]heptan	407-360-1	116230-20-7	0,5	5		AGS, 11	07/13
4-Hydroxy-4-methyl-pentan-2-on	204-626-7	123-42-2	20	96	2(I)	DFG, H	01/06
Isobutan	200-857-2	75-28-5	1000	2400	4(II)	DFG	01/06
Isobutylacetat	203-745-1	110-19-0	62	300	2 (I)	Y, AGS	07/12
Isobutylchlorformiat	208-840-1	543-27-1	0,2	1,1	2(I)	DFG, Y	01/06
3-Isocyanatmethyl-3,5,5-trimethylcyclohexylisocyanat	223-861-6	4098-71-9	0,005	0,046	1;=2=(I)	DFG, 11, 12, Sa	07/13
o-(p-Isocyanatobenzyl)phenylisocyanat	227-534-9	5873-54-1		0,05	1;=2=(I)	AGS, 11, 12	02/09
Isopentylacetat	204-662-3	123-92-2	50	270	1(I)	DFG, EU	01/06

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.		Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs- faktor	Bemerkungen	Monat/ Jahr
Isophthalsäure (m-Phthalsäure)	204-506-4	121-91-5		5 E	2(I)	Y, DFG	02/13
Isopren	201-143-3	78-79-5	3	8,4	8 (II)	AGS, X	07/13
Isopropenylacetat	203-562-7	108-22-5	10	46	2(I)	DFG	01/06
2-Isopropoxy-ethanol	203-685-6	109-59-1	5	22	8(II)	DFG, H, Y	01/06
Isotridecan-1-ol (Langkettige Alkohole)	248-469-2	27458-92-0	20	164	1(I)	AGS, 11	07/13
Isovaleraldehyd	209-691-5	590-86-3	10	39	1(I)	AGS	01/06
Kieselglas	262-373-8	60676-86-0		0,3 A		DFG, Y	01/06
Kieselgur, gebrannt	272-489-0	68855-54-9		0,3 A		DFG, Y, 1	05/10
Kieselgur, ungebrannt		61790-53-2		4 E		DFG, Y, 1	01/06
Kieselgut	231-716-3	7699-41-4		0,3 A		DFG, Y	01/06
Kieselrauch	273-761-1	69012-64-2		0,3 A		DFG, Y, 1	05/10
Kieselsäuren, amorphe	231-545-4	7631-86-9		4 E		DFG, 2, Y	01/06
Kohlenstoffdioxid	204-696-9	124-38-9	5000	9100	2(II)	DFG, EU	01/06
Kohlenstoffdisulfid	200-843-6	75-15-0	10	30	2(II)	AGS, EU, H	02/09
Kohlenstoffmonoxid	211-128-3	630-08-0	30	35	2(II)	DFG, Z	07/12
Kohlenstofftetrachlorid	200-262-8	56-23-5	0,5	3,2	2(II)	DFG, H, Y	05/09
Kohlenwasserstoffgemische, Verwendung als Löse- mittel (Lösemittelkohlenwasserstoffe), additiv-frei siehe auch Nummer 2.9 Fraktionen (RCP-Gruppen):					2(II)	AGS	12/07
C5-C8 Aliphaten				1500			
C9-C15 Aliphaten				600			
C7-C8 Aromaten				200			
C9-C15 Aromaten				100			
Lithiumhydrid	231-484-3	7580-67-8		0,025 E		EU, 13	12/07
Lithiumverbindungen, anorganische, mit Ausnahme von Lithium und stärker reizenden Lithiumverbindun- gen				0,2 E	1(I)	Y, 10, DFG	02/15
Malathion (ISO)	204-497-7	121-75-5		15 E	4(II)	DFG	01/06
Maleinsäureanhydrid	203-571-6	108-31-6	0,1	0,41	1;=2=(I)	DFG, Y, Sa, 11	07/13
Mangan und seine anorganischen Verbindungen	231-105-1	7439-96-5		0,02 A, 0,2 E	8(II)	DFG, Y, 10,20	09/15
pMDI (als MDI berechnet)		9016-87-9		0,05 E	1;=2=(I)	DFG, H, Sah, Y, 12	5/2010
Mecrilat	205-275-2	137-05-3	2	9,2	1(I)	DFG	01/06

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.	Bemerkungen	Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs-faktor		Monat/ Jahr
(R)-p-Mentha-1,8-dien (D-Limonen)	227-813-5	5989-27-5	5	28	4(II)	DFG, H, Sh, Y	02/13
Mesitylen	203-604-4	108-67-8	20	100	2(II)	DFG, EU, Y	01/06
Methanol	200-659-6	67-56-1	200	270	4(II)	DFG, EU, H, Y	01/06
Methansulfonsäure	200-898-6	75-75-2		0,7	1(I)	AGS, Y, 11	02/15
Methanthiol	200-822-1	74-93-1	0,5	1	2(II)	DFG	01/06
Methoxyessigsäure	210-894-6	625-45-6	5	19	2(I)	DFG, Z	01/06
2-Methoxyethanol	203-713-7	109-86-4	1	3,2	8(II)	DFG, EU, H, Z	05/2010
2-(2-Methoxyethoxy)ethanol	203-906-6	111-77-3	10	50		EU, Y, H, 11	07/13
2-(2-(2-Methoxyethoxy)ethoxy)ethanol	203-962-1	112-35-6		50 E	2 (II)	Y, 11, DFG	07/12
2-Methoxyethylacetat	203-772-9	110-49-6	1	4,9	8(II)	DFG, EU, H, Z	05/2010
(2-Methoxymethylethoxy)propanol (Isomerengemisch)	252-104-2	34590-94-8	50	310	1(I)	DFG, EU, 11	07/13
2-Methoxy-1-methylethylacetat	203-603-9	108-65-6	50	270	1(I)	DFG, EU, Y	01/06
1-Methoxy-2-propanol	203-539-1	107-98-2	100	370	2(I)	DFG, EU, Y	01/06
2-Methoxypropanol	216-455-5	1589-47-5	5	19	8(II)	DFG, H, Z	01/06
2-Methoxypropylacetat	274-724-2	70657-70-4	5	28	8(II)	DFG, H, Z	01/06

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.	Bemerkungen	Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs-faktor		Monat/ Jahr
Methylacetat	201-185-2	79-20-9	200	610	4(II)	DFG, Y	01/06
Methylacrylat	202-500-6	96-33-3	5	18	1(I)	DFG, EU, H	01/06
Methylamin	200-820-0	74-89-5	10	13	=1=(I)	DFG	01/06
N-Methylanilin	202-870-9	100-61-8	0,5	2,2	2(II)	DFG, H, 6	01/06
2-Methyl-2-azabicyclo[2.2.1]heptan	404-810-9	4524-95-2	5	20		AGS	01/06
Methylbutan	201-142-8	78-78-4	1000	3000	2(II)	DFG, EU	01/06
2-Methylbut-3-en-2-ol	204-068-4	115-18-4	0,6	2	2(I)	AGS	01/06
2-Methylbut-3-in-2-ol	204-070-5	115-19-5	0,9	3	2(I)	AGS	01/06
1-Methylbutylacetat	210-946-8	626-38-0	50	270	1(I)	DFG, EU	01/06
2-Methylbutylacetat	210-843-8	624-41-9	50	270	1(I)	DFG, Y	01/06
Methylchloracetat	202-501-1	96-34-4	1	4,5	1(I)	DFG, H, Y	05/09
Methyl-chlorformiat	201-187-3	79-22-1	0,2	0,78	2(I)	DFG, Y	01/06
Methylcyclohexan	203-624-3	108-87-2	200	810	2(II)	DFG	01/06
Methylcyclohexanol, Techn. Gemisch	247-152-6	25639-42-3	6	28	2(II)	AGS	05/08
Methylcyclopentan	202-503-2	96-37-7	500	1800	2 (II)	DFG	7/10

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.		Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs-faktor	Bemerkungen	Monat/ Jahr
2,2'-Methyldiphenyldiisocyanat	219-799-4	2536-05-2		0,05	1;=2=(I)	AGS, 11, 12	07/13
4,4'-Methyldiphenyldiisocyanat	202-966-0	101-68-8		0,05 E	1;=2=(I)	DFG, 11, 12, H, Sah, Y	07/13
Methylformiat	203-481-7	107-31-3	50	120	4(II)	DFG, H, Y	01/06
5-Methyl-3-heptanon	208-793-7	541-85-5	10	53	2(I)	DFG, EU	01/06
5-Methylhexan-2-on	203-737-8	110-12-3	20	95		EU	01/06
Methylisocyanat	210-866-3	624-83-9	0,01	0,024	1(I)	DFG, EU, H, 12	01/06
Methyl-methacrylat	201-297-1	80-62-6	50	210	2(I)	DFG, EU, Y	01/06
2-Methylpentan	203-523-4	107-83-5	500	1800	2(II)	DFG	07/10
3-Methylpentan	202-481-4	96-14-0	500	1800	2(II)	DFG	07/10
4-Methyl-pentan-2-ol	203-551-7	108-11-2	20	85	1(I)	DFG	01/06
4-Methylpentan-2-on	203-550-1	108-10-1	20	83	2(I)	DFG, EU, H, Y	01/06
4-Methyl-m-phenylendiisocyanat	209-544-5	584-84-9	0,005	0,035	1;=4=(I)	AGS, 11, 12, Sa	07/13
2-Methyl-m-phenylendiisocyanat	202-039-0	91-08-7	0,005	0,035	1;=4=(I)	AGS, 11, 12, Sa	07/13
2-Methylpropan-1-ol	201-148-0	78-83-1	100	310	1(I)	DFG, Y	01/06
2-Methylpropanol-2	200-889-7	75-65-0	20	62	4(II)	DFG, Y	05/09

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.		Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs-faktor	Bemerkungen	Monat/ Jahr
N-Methyl-2-pyrrolidon (Dampf)	212-828-1	872-50-4	20	82	2(I)	EU, DFG, AGS, H, Y, 11, 19	07/13
Methylvinylether	203-475-4	107-25-5	50	120	2(II)	Y, AGS	02/13
Mevinphos (ISO)	232-095-1	7786-34-7	0,01	0,093	2(II)	DFG, H, 11	07/13
Morpholin	203-815-1	110-91-8	10	36	2(I)	DFG, EU, H, 6	01/06
Naled	206-098-3	300-76-5		1 E	2(II)	DFG, AGS, Sh, Y, H	12/07
Naphthalin	202-049-5	91-20-3	0,1	0,5 E	1(I)	AGS, H, Y, 11	03/11
1-Naphthylamin	205-138-7	134-32-7	0,17	1 E	4(II)	AGS, H, 11	07/13
1,5-Naphthylendiisocyanat	221-641-4	3173-72-6		0,05	1;=2=(I)	AGS, 11, 12, Sa	12/07
Natriumazid	247-852-1	26628-22-8		0,2	2(I)	DFG, EU	01/06
Natriumfluoracetat	200-548-2	62-74-8		0,05 E	4(II)	DFG, H, Z	07/12
Nickelmetall	231-111-4	7440-02-0		0,006 A	8(II)	AGS, 10, Sh, Y	09/15
Nikotin	200-193-3	54-11-5		0,5	2(II)	EU, 11, 13, H	07/13
Nitrobenzol	202-716-0	98-95-3		1	2(II)	EU, H	12/07
Nitroethan	201-188-9	79-24-3	100	310	4(II)	DFG	01/06
1-Nitropropan	203-544-9	108-03-2	25	92	4(I)	DFG, H, 3	01/06

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.		Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs-faktor	Bemerkungen	Monat/ Jahr
Norfluran	212-377-0	811-97-2	1000	4200	8(II)	DFG, Y	01/06
Octadecan-1-ol (Langkettige Alkohole)	204-017-6	112-92-5	20	224	1(I)	AGS	01/06
Octan (alle Isomeren außer Trimethylpentan-Isomere)			500	2400	2(II)	DFG	01/06
Octan-1-ol (Langkettige Alkohole)	203-917-6	111-87-5	20	106	1(I)	AGS, 11	07/13
2-Octyl-2H-isothiazol-3-on	247-761-7	26530-20-1		0,05 E	2(I)	DFG, H, Y	01/06
Orthophosphorsäure	231-633-2	7664-38-2		2 E	2(I)	DFG, EU, AGS, Y	12/07
Oxalsäure	205-634-3	144-62-7		1 E	1(I)	H, EU, 13	12/07
2,2'-Oxydiethanol	203-872-2	111-46-6	10	44	4(II)	DFG, Y, 11	07/13
Oxydipropanol (Dipropylenglykol)	246-770-3	25265-71-8		100 E	2(II)	DFG, H, Y, 11	07/13
Paraquatdichlorid	217-615-7	1910-42-5		0,1 E	1(I)	DFG, H	01/06
Parathion (ISO)	200-271-7	56-38-2		0,1 E	8(II)	DFG, H	01/06
Pentaboran	243-194-4	19624-22-7	0,005	0,013	2(II)	DFG	01/06
Pentacarbonylisen	236-670-8	13463-40-6	0,1	0,81	2(I)	DFG, H	07/12
Pentan	203-692-4	109-66-0	1000	3000	2(II)	DFG, EU, Y	05/09
Pentan-2,4-dion (Acetylaceton)	204-634-0	123-54-6	30	126	2(II)	AGS, H, Y	12/07

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.		Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs-faktor	Bemerkungen	Monat/ Jahr
Pentylacetat	211-047-3	628-63-7	50	270	1(I)	DFG, EU, Y	01/06
3-Pentylacetat		620-11-1	50	270	1(I)	DFG, EU	01/06
Perfluorooctansulfonsäure	217-179-8	1763-23-1		0,01 E	8 (II)	H, Z, DFG	12/11
Phenol	203-632-7	108-95-2	2	8	2(II)	EU, H, 11	07/13
2-Phenoxyethanol	204-589-7	122-99-6	20	110	2(I)	DFG, H, Y, 11	07/13
p-Phenyldiamin	203-404-7	106-50-3		0,1 E	2(II)	DFG, H, Y, 11	07/13
Phenylisocyanat	203-137-6	103-71-9	0,01	0,05	1(I)	AGS, 12, Sa	12/07
Phenylphosphin	211-325-4	638-21-1	0,01	0,05		AGS	01/06
2-Phenylpropen	202-705-0	98-83-9	50	250	2(I)	DFG, EU	01/06
Phosgen	200-870-3	75-44-5	0,1	0,41	2(I)	DFG, EU, AGS, Y	05/09
Phosphin	232-260-8	7803-51-2	0,1	0,14	2(II)	EU, DFG, Y	03/11
Phosphor, weiss/gelb	601-810-2	12185-10-3		0,01 E	2(II)	AGS, Y	05/08
Phosphorpentachlorid	233-060-3	10026-13-8		1 E	1(I)	DFG, EU, 11	07/13
Phosphorpentoxid (als Orthophosphorsäure)	215-236-1	1314-56-3		2 E	2(I)	DFG, AGS, Y	12/07
Phosphortrichlorid	231-749-3	7719-12-2	0,5	2,8	1(I)	DFG, Y	05/09
Phosphoryltrichlorid	233-046-7	10025-87-3	0,2	1,3	1(I)	DFG	01/06

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.	Bemerkungen	Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs-faktor		Monat/ Jahr
Piperazin	203-808-3	110-85-0		0,1	1(I)	EU, 6, 11, 13	07/13
Platin (Metall)	231-116-1	7440-06-4		1 E		EU, 13	12/07
Polyalphaolefine		z.B. 68649-12-7		5 A	4(II)	Y, DFG	12/11
Polyethylenglykole (PEG) (mittlere Molmasse 200 – 400)				1000 E	8(II)	DFG, Y	01/06
Polyethylenglykol 600 (PEG 600)				1000 E	8(II)	DFG, Y	01/06
Propan	200-827-9	74-98-6	1000	1800	4(II)	DFG	01/06
Propan-1,2-diyldinitrat	229-180-0	6423-43-4	0,05	0,34	1(II)	DFG, H, 7, 11	07/13
Propan-2-ol	200-661-7	67-63-0	200	500	2(II)	DFG, Y	01/06
Prop-2-in-1-ol	203-471-2	107-19-7	2	4,7	2(I)	DFG, H	01/06
Propionsäure	201-176-3	79-09-4	10	31	2 (I)	EU, DFG, Y	03/11
Propoxur (ISO)	204-043-8	114-26-1		2 E	8(II)	DFG	01/06
Propylenoxid	200-879-2	75-56-9	2	4,8	2 (I)	AGS, X, Y, Sh	07/13
2-(Propyloxy)ethanol	220-548-6	2807-30-9	20	86	2(I)	DFG, H, Y	01/06
(2-Propyloxy)ethylacetat		20706-25-6	20	120	2(I)	DFG, H, Y, 11	07/13

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.	Bemerkungen	Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs-faktor		Monat/ Jahr
N-Isopropyl-N'-phenyl-p-phenylendiamin	202-969-7	101-72-4		2 E	2 (II)	DFG, Y, Sh	07/13
Pyrethrum (gereinigter Rohextrakt)	232-319-8	8003-34-7		1 E	1(I)	AGS, EU, Y; Sh für Rohextrakt	12/07
Pyridin-2-thiol-1-oxid, Natriumsalz (Pyrithionnatrium)	223-296-5 240-062-8	3811-73-2 15922-78-8		1 E	2(II)	DFG, H, Z	07/12
Quecksilber	231-106-7	7439-97-6		0,02	8(II)	EU, DFG, , H, Sh	11/11
Quecksilberverbindungen, anorganische				0,02 E	8(II)	EU, DFG, 10, H, Sh	11/11
Salpetersäure	231-714-2	7697-37-2	1	2,6		EU, 13, 16	12/07
Schwefeldioxid	231-195-2	7446-09-5	1	2,5	1(I)	AGS, Y	11/11
Schwefelhexafluorid	219-854-2	2551-62-4	1000	6100	8(II)	DFG	01/06
Schwefelsäure	231-639-5	7664-93-9		0,1 E	1(I)	DFG, EU, Y	11/11
Selen	231-957-4	7782-49-2		0,05 E	1(II)	DFG, Y	12/07
Selenverbindungen, anorganische				0,05 E	1(II)	DFG, Y, 10	12/07
Silber	231-131-3	7440-22-4		0,1 E	8(II)	DFG, EU	01/06
Silberverbindungen, anorganische				0,01 E	2(I)	DFG, EU, 10	01/06
Styrol	202-851-5	100-42-5	20	86	2(II)	DFG, Y	01/06

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.		Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs- faktor	Bemerkungen	Monat/ Jahr
Sulfonsäuren, Erdöl-, Calciumsalze	263-093-9	61789-86-4		5 A	4(II)	DFG	09/15
Sulfotep (ISO)	222-995-2	3689-24-5	0,01	0,13	2(II)	DFG, EU, 11, H, Y	07/13
Sulfuryldifluorid	220-281-5	2699-79-8		10		NL-Experten	01/06
Terephthalsäure (p-Phthalsäure)	202-830-0	100-21-0		5 E	2(I)	Y, DFG	02/13
TEPP (ISO)	203-495-3	107-49-3	0,005	0,06	2(II)	DFG, H, 11	07/13
1,1,1,2-Tetrachlor-2,2-difluoethan (R 112a)	200-934-0	76-11-9	200	1700	2(II)	DFG	04/07
Tetrachlor-1,2-difluoethan (R 112)	200-935-6	76-12-0	200	1700	2(II)	DFG	01/06
1,1,2,2-Tetrachlorethan	201-197-8	79-34-5	1	7	2(II)	DFG, H	01/06
Tetrachlorethen (Per)	204-825-9	127-18-4	20	138	2 (II)	H, Y, AGS, EU	12/11
Tetradecanol (Langkettige Alkohole)	204-000-3	112-72-1	20	178	1(I)	AGS, 11	07/13
Tetradecylammoniumbis(1-(5-chlor-2- oxidophenylazo)-2-naphtholato)chromat(1-)	405-110-6	88377-66-6		10 (E)	2(II)	AGS, 18	02/09
Tetraethylblei	201-075-4	78-00-2		0,05	2(II)	DFG, H, Z, 10	05/2010
Tetraethylorthosilikat (TEOS)	201-083-8	78-10-4	1,4	12	1(I)	AGS	5/2010
Tetrahydrofuran	203-726-8	109-99-9	50	150	2(I)	DFG, EU, H, Y	01/06
3a,4,7,7a-Tetrahydro-4,7-methanoinden	201-052-9	77-73-6	0,5	2,7	1(I)	DFG	01/06

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.		Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs- faktor	Bemerkungen	Monat/ Jahr
Tetrahydrothiophen	203-728-9	110-01-0	50	180	1(I)	DFG, Y, H	05/08
Tetramethylblei	200-897-0	75-74-1		0,05	2(II)	DFG, H, Z, 10	05/2010
Tetramethylorthosilikat	211-656-4	681-84-5	0,3	2	1(I)	AGS	01/06
Tetramethylsuccinitril		3333-52-6		1	2(II)	AGS	04/07
Thiabendazol	205-725-8	148-79-8		20 E	2(II)	DFG, Y	5/2010
Thiram	205-286-2	137-26-8		1 E	2(II)	DFG, 6, Sh	07/13
Thioglykolate				2 E	2 (II)	DFG, Y, H, Sh	07/13
Toluol	203-625-9	108-88-3	50	190	4(II)	DFG, EU, H, Y	01/06
Tributylphosphat	204-800-2	126-73-8	1	11	2 (II)	DFG, Y, H, 11	07/13
Trichlorbenzol (alle Isomeren außer 1,2,4- Trichlorbenzol)	234-413-4	12002-48-1	5	38	2(II)	DFG, H, Y	05/09
1,2,4-Trichlorbenzol	204-428-0	120-82-1	0,5	3,8	4(II)	AGS, EU	01/06
1,1,1-Trichlorethan	200-756-3	71-55-6	200	1100	1(II)	DFG, EU, H, Y	01/06
1,1,2-Trichlorethan	201-166-9	79-00-5	10	55	2(II)	DFG, H	01/06
Trichlorfluormethan (R 11)	200-892-3	75-69-4	1000	5700	2(II)	DFG, Y	01/06
Trichlormethan (Chloroform)	200-663-8	67-66-3	0,5	2,5	2(II)	DFG, EU, Y, H, X	12/07

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.		Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs- faktor	Bemerkungen	Monat/ Jahr
Trichlor-nitro-methan	200-930-9	76-06-2	0,1	0,68	1(I)	DFG	01/06
1,1,2-Trichlortrifluorethan (R 113)	200-936-1	76-13-1	500	3900	2(II)	DFG	01/06
Triethylamin	204-469-4	121-44-8	1	4,2	2(I)	DFG, EU, H, 6	01/06
Triisobutylphosphat	204-798-3	126-71-6		50	2 (II)	AGS, Sh, 11	07/13
1,2,3-Trimethylbenzol	208-394-8	526-73-8	20	100	2(II)	DFG, EU, Y	01/06
1,2,4-Trimethylbenzol	202-436-9	95-63-6	20	100	2(II)	DFG, EU, Y	01/06
3,5,5-Trimethylcyclohex-2-enon	201-126-0	78-59-1	2	11	2(I)	DFG, Y, H, 11	07/13
2,4,6-Trinitrophenol (Pikrinsäure)	201-865-9	88-89-1		0,1 E	1(I)	H, EU, 13	12/07
Triphenylphosphin	210-036-0	603-35-0		5 E	2 (II)	DFG, Sh, Y	03/11
Vanadiumverbindungen, anorganische, 4+- und 5+wertige (z.B. Divanadiumpentaoxid)	(z.B. 215-239-8)	(z.B. 1314-62-1)		0,005 A, 0,030 E	1(I)	AGS, Y, 10, 21	09/15
Vinylacetat	203-545-4	108-05-4	5	18	2(I)	AGS, EU	12/07
Vinytoluol (alle Isomeren)	246-562-2	25013-15-4	100	490	2(I)	DFG	01/06
N-Vinyl-2-pyrrolidon		88-12-0	0,01	0,05	2(II)	H, Y, AGS, 11	07/13
Warfarin	201-377-6	81-81-2	0,0016	0,02 E	8 (II)	DFG, H, Z, 11	07/12
Warfarinnatrium	204-929-4	129-06-6		0,02 E	8 (II)	DFG, H, Z	07/12

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.		Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs- faktor	Bemerkungen	Monat/ Jahr
Weißes Mineralöl (Erdöl)	232-455-8	8042-47-5		5 A	4(II)	DFG, Y	09/15
Xylol (alle Isomeren)	215-535-7	1330-20-7	100	440	2(II)	DFG, EU, H	01/06
Zinn(II)-Verbindungen, anorganische				8 E		AGS, 10	12/07
Zinn(IV)-Verbindungen, anorganische				2 E		EU, 13, 10	12/07
Zinnverbindungen, organische							
- n-Butylzinnverbindungen			0,0018	0,009	1 (I)	H, Y, 10, 11, AGS	02/14
Mono-n-butylzinnverbindungen, Di-n-butylzinnverbindungen, Tri-n-butylzinnverbindungen und Tetra-n-butylzinn	215-960-8	1461-25-2					
- Methylzinnverbindungen							
Mono- und Dimethylzinnverbindungen mit Ausnahme der separat genannten			0,0018	0,009	1(I)	AGS, Y, 10, 11	09/15
Triisooctyl-2,2',2"- ((methylstannylidin)tris(thio))triacetat, Bis[methylzinn-di((isooctylmercaptoacetat))sulfid], Bis[methylzinn-di(2-mercaptoethyleat)]sulfid	259-374-0	54849-38-6 59118-99-9	0,2	1	2(II)	DFG, Z, 10, 11	09/15

Stoffidentität			Arbeitsplatzgrenzwert		Spitzenbegr.		Änderung
Bezeichnung	EG-Nr.	CAS-Nr.	ml/m ³ (ppm)	mg/m ³	Überschreitungs- faktor	Bemerkungen	Monat/ Jahr
Diisooctyl-2,2'- ((dimethylstannyl)bis(thio))diacetat, 2-Ethylhexyl-10-ethyl-4,4-dimethyl-7-oxo-8-oxa- 3,5-dithia-4-stannatetradecanoat, Bis[dimethylzinn(isooctylmercapto-acetat)]sulfid, Bis[dimethylzinn(2-mercaptoethyleat)]sulfid	247-862-6 260-829-0	26636-01-1 57583-35-4	0,01	0,05	2(II)	DFG, Y, 10, 11	09/15
Trimethylzinnverbindungen und Tetramethylzinn	209-833-6	594-27-4	0,001	0,005	4(II)	DFG, H, 10, 11	09/15
- n-Octylzinnverbindungen			0,002	0,01	2 (II)	H, Y, 10, 11, AGS, DFG	02/14
Mono-n-octylzinnverbindungen, Di-n-octylzinnverbindungen, Tri-n-octylzinnverbindungen und Tetra-n-octylzinn	222-733-7	3590-84-9					
- Phenylzinnverbindungen			0,0004	0,002 E	2 (II)	H, Y, 10, 11, AGS, DFG	09/14
Zirkonium und wasserunlösliche Verbindungen	231-176-9	7440-67-7		1 E	1(I)	10, DFG, Sah	12/07

➤ Ireland⁸⁹
List of Chemical Agents and Occupational Exposure Limit Values (OELVs)

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
Acetaldehyde	200-836-8	75-07-0	25	45	25	45	-
Acetic acid	200-580-7	64-19-7	10	25	15	37	IOELV
Acetic anhydride	203-564-8	108-24-7	0.5	2.5	2	10	-
Acetone	200-662-2	67-64-1	500	1210	-	-	IOELV
Acetonitrile	200-835-2	75-05-8	40	70	-	-	Sk, IOELV
Acetophenone	202-708-7	98-86-2	10	49	-	-	-
Acetylene	200-816-9	74-86-2	-	-	-	-	Asphx
Acetylene Dichloride	208-750-2	540-59-0	200	790	250	1000	-
Acetylene Tetrabromide, see 1,1,2,2-Tetrabromoethane							
o-Acetylsalicylic acid, (Aspirin)	200-064-1	50-78-2	-	5	-	-	-
Acrolein	203-453-4	107-02-8	0.1	0.25	0.3	0.8	-
Acrylaldehyde, See Acrolein							
Acrylamide	201-173-7	79-06-1	-	0.03	-	-	Sk, Carc1B, Muta1B
Acrylic acid	201-177-9	79-10-7	2	6	-	-	-
Acrylonitrile	203-466-5	107-13-1	2	4.5	-	-	Sk, Carc1B
Adipic acid	204-673-3	124-04-9	-	5	-	-	-
Aldrin (ISO)	206-215-8	309-00-2	-	0.05 (IFV)	-	0.75	Sk
Aliphatic hydrocarbon gases							
Alkanes (C1-C4)							
Butane	203-448-7	106-97-8	1000				-
Ethane	200-814-8	74-84-0	1000				Asphx
Methane	200-812-7	74-82-8	1000				Asphx
Propane	200-827-9	74-98-6	1000				Asphx
Allyl alcohol	203-470-7	107-18-6	2	4.8	5	12.1	Sk, IOELV
Allyl chloride	203-457-6	107-05-1	1	3	2	6	-
Allyl 2,3-epoxypropyl ether	203-442-4	106-92-3	5	22	10	44	-
Allyl glycidyl ether (AGE), see Allyl 2,3-epoxypropyl ether							
Allyl propyl disulphide	218-550-7	2179-59-1	0.5				-
Aluminium alkyl compounds	-	-	-	2	-	-	-
Aluminium metal;	231-072-3	7429-90-5	-	1 (R)	-	-	-
			-		-	-	-
Aluminium oxides; total inhalable dust	215-691-6	1344-28-1	-	10	-	-	-
respirable dust			-	4	-	-	-
Aluminium salts, soluble	-	-	-	2	-	-	-
Aminodimethylbenzene, see Xyldine							
4-Aminodiphenyl	202-177-1	92-67-1	-	-	-	-	Sk, Carc1A
2-Aminoethanol	205-483-3	141-43-5	1	2.5	3	7.6	Sk, IOELV
2-Aminopyridine	207-988-4	504-29-0	0.5	2	2	8	-
3-Amino-1,2,4 Triazole, (Amitrole)	200-521-5	61-82-5	-	0.2	-	-	-
Ammonia, anhydrous	231-635-3	7664-41-7	20	14	50	36	IOELV
Ammonium chloride, fume	235-186-4	12125-02-9	-	10	-	20	-
Ammonium Perfluorooctanoate	223-320-4	3825-26-1	-	0.01	-	-	Sk
Ammonium sulphamidate	231-871-7	7773-06-0	-	10	-	20	-
n-Amyl acetate, see Pentyl acetate							
Sec-Amyl acetate, see 1-Methyl butyl acetate							

⁸⁹ Health and Safety Authority, 2011, 2011 Code of Practice for the Safety, Health and Welfare at Work (Chemical Agent) Regulations 2001. S.I. No. 619 of 2001.

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
Tert-Amyl acetate	211-047-3	625-16-1	50	270	100	540	IOELV
Aniline	200-539-3	62-53-3	1	3.8	-	-	Sk
o-Anisidine	201-963-1	90-04-0	0.1	0.5	-	-	Sk, Carc1B
p-Anisidine	203-254-2	104-94-9	0.1	0.5	-	-	Sk
Antimony & compounds (as Sb)	231-146-5	7440-36-0	-	0.5	-	-	-
Araldite PT 810, see Triglycidyl isocyanurate, (TGIC)							
Argon	231-147-0	7440-37-1	-	-	-	-	Asphx
Arsenic & compounds except arsine (as As)	231-148-6	7440-38-2	-	0.01	-	-	Carc1A
Arsine	232-066-3	7784-42-1	0.005	0.02	-	-	-
Asbestos,(all types of asbestos fibre, as listed in Directive 2003/18/EC and implemented by S.I. No. 386 Of 2006)							
Crocidolite	2001-28-4			0.1 fibres/cm ³ of air			BOELV,Carc1A
Amosite	12172-73-5			0.1 fibres/cm ³ of air			BOELV,Carc1A
Chrysotile	12001-29-5			0.1 fibres/cm ³ of air			BOELV,Carc1A
Actinolite	77536-66-4			0.1 fibres/cm ³ of air			BOELV,Carc1A
Anthophyllite	77536-67-5			0.1 fibres/cm ³ of air			BOELV,Carc1A
Tremolite	77536-68-6			0.1 fibres/cm ³ of air			BOELV,Carc1A
Asphalt (Bitumen), petroleum fumes, (inhalable fraction)	232-490-9	8052-42-4	-	0.5	-	10	-
Aspirin, see o-Acetylsalicylic acid							
Atrazine (ISO)	217-617-8	1912-24-9	-	10	-	-	-
Azinphos-methyl (ISO), see Guthion							
Aziridine, see Ethylenimine							
Azodicarbonamide (C, C'-azodi(formamide))	204-650-8	123-77-3	-	1	-	3	Sen
Barium compounds, (soluble compounds as Ba)	231-149-1	7440-39-3	-	0.5	-	-	IOELV
Barium sulphate, respirable dust	231-784-4	7727-43-7	-	2	-	-	-
Benomyl (ISO)	241-775-7	17804-35-2	-	10	-	15	-
Benz[α]anthracene	200-280-6	56-55-3	-	-	-	-	Carc1B
Benzene	200-753-7	71-43-2	1	3	-	-	BOELV, Sk, Carc1A
Benzenethiol	203-635-3	108-98-5	0.5	2	-	-	Sk
Benzene-1,2,4-tricarboxylic acid 1,2-anhydride, see Trimelletic anhydride							
Benzenidene	202-199-1	92-87-5	-	-	-	-	Sk, Carc1A
Benzo[β]fluroanthene	205-911-9	205-99-2	-	-	-	-	Carc1B
Benzo[α]pyrene	200-028-5	50-32-8	-	-	-	-	Carc1B, Muta1B, Repr1B
p-Benzoquinone, see Quinone							
Benzoyl peroxide, see Dibenzoyl peroxide							
Benzyl butyl phthalate, see Butyl benzyl phthalate							
Beryllium chloride	202-853-6	100-44-7	0.5	2.6	1.5	7.9	Carc1B
Beryllium and beryllium compounds (as Be)	231-150-7	7440-41-7	-	0.0002	-	-	Carc1B
γ-BHC (ISO), see γ-Hexachlorocyclohexane							

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
Biphenyl	202-163-5	92-52-4	0.2	1.5	0.6	4	-
BCME, see bis(Chloromethyl) ether							
2,2-Bis(p-chlorophenyl)-1,1,1-trichloroethane, see 1,1,1-Trichlorobis (chlorophenyl)ethane							
Bis(2,3-epoxypropyl)ether, see Diglycidyl ether (DGE)							
Bis(2-ethylhexyl) Phthalate, see Di-sec-octyl-phthalate							
2,2Bis(p-methoxyphenyl) -1,1,1-trichloroethane, see Methoxychlor(ISO)							
Bisphenol A (4,4'-isopropylidenediphenol) (Inhalable dust)	201-245-8	80-05-7		10			IOELV
Bismuth telluride	215-135-2	1304-82-1	-	10	-	20	-
Bismuth telluride, selenium-doped	-	-	-	5	-	10	-
Borates, (tetra) sodium							
anhydrous	-	1330-43-4	-	1	-	-	-
decahydrate	-	1303-96-4	-	5	-	-	-
pentahydrate	-	12179-04-3	-	1	-	-	-
Bornan-2-one	200-945-0	76-22-2	2	12	3	18	-
Boron oxide	215-125-8	1303-86-2	-	10	-	20	-
Boron tribromide	233-657-9	10294-33-4	-	-	1	10	-
Boron trifluoride	231-569-5	7637-07-2	-	-	1	3	-
Bromacil (ISO)	206-245-1	314-40-9	1	10	2	20	-
Bromine	231-778-1	7726-95-6	0.1	0.7	0.3	2	IOELV
Bromine pentafluoride	232-157-8	7789-30-2	0.1	0.7	0.3	2	-
Bromochloromethane	200-826-3	74-97-5	200	1050			-
Bromoethane, see Ethyl bromide							
Bromoethylene, see Vinyl bromide							
Bromoform, see Tribromomethane							
Bromomethane	200-813-2	74-83-9	5	20	15	60	Sk
Bromotrifluoromethane, see Trifluorobromomethane							
Buta-1,3-diene	203-450-8	106-99-0	1	2.2	-	-	Carc1A, Muta1B
Butane (see aliphatic hydrocarbon gases)							
Butanethiol	203-705-3	109-79-5	0.5	1.8	-	-	-
Butan-1-ol	200-751-6	71-36-3	20	-			Sk
Butan-2-ol	201-158-5	78-92-2	100	300	150	450	-
Butan-2-one, see Methyl ethyl ketone (MEK)							
trans But-2-enal	204-647-1	123-73-9	2	6	6	18	-
2-Butoxyethanol (EGBE)	203-905-0	111-76-2	20	98	50	246	Sk, IOELV
2-(2-Butoxyethoxy)ethanol	203-961-6	112-34-5	10	67.5	15	101.2	IOELV
2-Butoxyethyl acetate (EGBEA)	203-933-3	112-07-2	20	133	50	333	Sk, IOELV
Butyl acetate	204-658-1	123-86-4	150	710	200	950	-
sec-Butyl acetate	203-300-1	105-46-4	200	950	250	1190	-
tert-Butyl acetate	208-760-7	540-88-5	200	950	250	1190	-
Butyl acrylate	205-480-7	141-32-2	2	11	10	53	IOELV
n-Butyl alcohol, see Butan-1-ol							
sec-Butyl alcohol, see Butan-2-ol							
tert-Butyl alcohol, see 2-Methyl propan-2-ol							
n-Butylamine	203-699-2	109-73-9	-	-	5	15	Sk

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
Butyl benzyl phthalate	201-622-7	85-68-7	-	5	-	-	-
n-Butyl chloroformate	209-750-5	592-34-7	1	5.6	-	-	-
tert-Butyl chromate		1189-85-1	-	0.1	-	0.1	-
Butyl-2,3-epoxypropyl ether(BGE)	219-376-4	2426-08-6	25	135	-	-	-
Butyl glycidyl ether, see Butyl-2,3-epoxypropylether							
Butyl lactate	205-316-4	138-22-7	5	25	-	-	-
n-Butyl mercaptan, see Butanethiol							
Tert-Butyl-methyl ether	216-653-1	1634-04-4	50	183.5	100	367	IOELV
2-sec- Butylphenol	201-933-8	89-72-5	5	30	-	-	Sk
p-tert Butyltoluene	202-675-9	98-51-1	1	6.1	-	-	-
Cadmium	231-152-8	7440-43-9	-	0.025	-	-	Carc1B
Cadmium compounds, except cadmium oxide fume and cadmium sulphide pigments (as Cd)	-	7440-43-9	-	0.01	-	-	Carc1B
Cadmium oxide fume (as Cd)				0.002 (R)			
Cadmium sulphide and cadmium sulphide pigments, respirable dust (as Cd)	215-146-2	1306-19-0	-	0.025	-	0.05	Carc1B
Caesium hydroxide	244-344-1	21351-79-1	-	2	-	-	-
Calcium carbonate total inhalable dust	215-279-6	1317-65-3	-	10	-	-	-
respirable dust			-	4	-	-	-
Calcium chromate (as Cr)	237-366-8	13765-19-0	-	0.001	-	-	Carc1B
Calcium cyanamide	205-861-8	156-62-7	-	0.5	-	1	-
Calcium hydroxide	215-137-3	1305-62-0	-	5	-	-	IOELV
Calcium oxide	215-138-9	1305-78-8	-	2	-	-	-
Calcium silicate total inhalable dust	215-710-8	1344-95-2	-	10	-	-	-
respirable dust			-	4	-	-	-
Calcium sulphate	231-900-3	7778-18-9	-	10	-	-	-
Camphor, synthetic, see Bornan-2-one							
ε-Caprolactam	203-313-2	105-60-2	-	10	-	40	IOELV
Captafol (ISO)	219-363-3	2425-06-1	-	0.1	-	-	Sk, Carc1B
Captan (ISO)	205-087-0	133-06-2	-	5	-	15	-
Carbaryl (ISO)	200-555-0	63-25-2	-	5	-	10	-
Carbofuran (ISO)	216-353-0	1563-66-2	-	0.1	-	-	-
Carbon black	215-609-9	1333-86-4	-	3.5	-	7	-
Carbon dioxide	204-696-9	124-38-9	5000	9000	15000	27000	IOELV
Carbon disulphide	200-843-6	75-15-0	5	15	-	-	Sk, IOELV
Carbon monoxide	211-128-3	630-08-0	20	23	100	115	Repr1A
Carbon tetrabromide	209-189-6	558-13-4	0.1	1.4	0.3	4	-
Carbon tetrachloride	200-262-8	56-23-5	2	12.6	-	-	Sk
Carbonyl chloride, see Phosgene							
Carbonyl fluoride	206-534-2	353-50-4	2	5.4	5	13	-
Catechol	204-427-5	120-80-9	5	20	-	-	-
Cellulose total inhalable dust	232-674-9	9004-34-6	-	10	-	20	-
respirable dust			-	4	-	-	-
Cement(Portland) total inhalable dust	266-043-4	65997-15-1	-	10	-	-	-
respirable dust			-	4	-	-	-
Chlordane (ISO)	200-349-0	57-74-9	-	0.5	-	2	Sk

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/m ³	ppm	mg/m ³	
Chlorinated biphenyls (42% chlorine) (54% chlorine)	215-648-1	1336-36-3	-	0.1	-	-	Sk
		53469-21-9	-	0.1	-	-	
		11097-69-1	-	0.1	-	-	
Chlorine	231-959-5	7782-50-5	-	-	0.5	1.5	IOELV
Chlorine dioxide	233-162-8	10049-04-4	0.1	0.3	0.3	0.9	-
Chlorine trifluoride	232-230-4	7790-91-2	-	-	0.1	0.4	-
Chloroacetaldehyde	203-472-8	107-20-0	-	-	1	3	-
Chloroacetone	201-161-1	78-95-5	1	3.8	1	3.8	Sk
2-Chloroacetophenone	208-531-1	532-27-4	0.05	0.3	-	-	-
Chloroacetyl chloride	201-171-6	79-04-9	0.05	0.2	-	-	-
Chlorobenzene (as monochlorobenzene)	203-628-5	108-90-7	5	23	15	70	IOELV
o-Chlorobenzylidene malonitrile	220-278-9	2698-41-1	0.05	0.39	0.05	0.39	Sk
Chlorobromomethane, see Bromochloromethane							
2-Chlorobuta-1,3-diene, see β -Chloroprene							
Chlorodifluoromethane, see Difluorochloromethane							
Chloroethane, see Ethyl chloride							
2-Chloroethanol, see Ethylene chlorohydrin							
Chloroethylene, see Vinyl chloride							
Chloroform	200-663-8	67-66-3	2	9.8	-	-	Sk, IOELV
Chloromethane	200-817-4	74-87-3	50	105	100	210	-
Bis(Chloromethyl) ether	208-832-8	542-88-1	0.001	0.005	-	-	Carc1A
Chloromethyl methyl ether	203-480-1	107-30-2	-	-	-	-	Carc1A
1-Chloro-4-nitrobenzene	202-809-6	100-00-5	-	1	-	2	Sk
1-Chloro-1-nitropropane	209-990-0	600-25-9	2	10	-	-	-
Chloropentafluoroethane	200-938-2	76-15-3	1000	6320	-	-	-
Chloropicrin	200-930-9	76-06-2	0.1	0.7	0.3	2	-
β -Chloroprene	204-818-0	126-99-8	10	36	-	-	Sk
3-Chloropropene, see Allyl chloride							
o-Chlorostyrene	218-026-8	2039-87-4	50	283	75	425	-
Chlorosulphonic acid	232-234-6	7790-94-5	-	1	-	-	-
α -Chlorotoluene, see Benzyl chloride							
2-Chlorotoluene	202-424-3	95-49-8	50	250	-	-	-
2-Chloro-6-(trichloromethyl) pyridine, see Nitrapyrin							
Chlorpyrifos (ISO)	220-864-4	2921-88-2	-	0.1 (IFV)	-	-	Sk
Chromium metal	231-157-5	7440-47-3	-	2	-	-	IOELV
Chromium (III) compounds (as Cr)	-	-	-	2	-	-	IOELV
Chromium (III) compounds (as Cr)	-	-	-	2	-	-	IOELV
Chromium (VI) compounds (as Cr)	-	-	-	-	-	-	Carc1B
Water Soluble				0.05			
Insoluble				0.01			
Chromyl Chloride	239-056-8	14977-61-8	0.025	0.16	-	-	Carc1B, Muta1B
Coal dust, respirable dust	-	-	-	1.6	-	-	-
Anthracite	-	-	-	0.4	-	-	-
Bituminous	-	-	-	0.9	-	-	-
Coal tar pitch volatiles, (as cyclohexane solubles)	266-028-2	65996-93-2	-	0.14	-	-	-
Cobalt & cobalt compounds (as Co)	231-158-0	7440-48-4	-	0.1	-	-	Sen

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
Copper (as Cu)	231-159-6	7440-50-8					
Fume			-	0.2	-	-	-
Dusts and mists (as Cu)			-	1	-	2	-
Cotton dust (raw or waste cotton)	-	-	-	2.5	-	-	-
Cresols, all isomers	215-293-2	1319-77-3	5	22	-	-	Sk, IOELV
Cristobalite, respirable dust, (see Silica, Crystalline)	238-455-4	14464-46-1		0.1	-	-	-
Crotonaldehyde	224-030-0	4170-30-0			0.3		-
Crufomate	206-083-1	299-86-5	-	5	-	-	-
Cryofluorane, see 1,2-Dichlorotetrafluoroethane							
Cumene, see Isopropylbenzene							
Cyanamide	206-992-3	420-04-2	0.58	1	-	-	Sk, IOELV
Cyanides, except hydrogen cyanide, cyanogen and cyanogen chloride, (as -CN)		57-12-5	-	5	-	-	Sk
Cyanogen	207-306-5	460-19-5	10	20	-	-	-
Cyanogen chloride	208-052-8	506-77-4	-	-	0.3	0.6	-
Cyclohexane	203-806-2	110-82-7	200	700	-	-	IOELV
Cyclohexanol	203-630-6	108-93-0	50	200	-	-	-
Cyclohexanone	203-631-1	108-94-1	10	40.8	20	81.6	Sk, IOELV
Cyclohexene	203-807-8	110-83-8	300	1015	-	-	-
Cyclohexylamine	203-629-0	108-91-8	10	40	-	-	Sk
Cyclonite, see Hexahydro-1,3,5-trinitro-1,3,5 triazine							
Cyclopentadiene	208-835-4	542-92-7	75	203	-	-	-
Cyclopentane	206-016-6	287-92-3	600	1720	-	-	-
Cyhexatin (ISO), see Tricyclohexyltin hydroxide							
2,4-D (ISO), see 2,4-Dichlorophenoxyacetic acid							
DDM, see 4-4'							
Diaminodiphenylmethane							
DDT, see 1,1,1-Trichlorobis (chlorophenyl) ethane							
DDVP, see Dichlorvos (ISO)							
Decaborane	241-711-8	17702-41-9	0.05	0.25	0.15	0.75	Sk
Demeton		8065-48-3	0.01	0.05 (IFV)			Sk
2,4-DES, see 2-(2,4-Dichlorophenoxy)ethyl hydrogen sulphate							
Derris, commercial, see Rotenone							
Diacetone alcohol	204-626-7	123-42-2	50	240	75	360	-
Dialkyl 79 phthalate	-	-	-	5	-	-	-
Diallyl phthalate	205-016-3	131-17-9	-	5	-	-	-
2,2-Diaminodiethylamine, see Diethylene triamine							
4,4-Diaminodiphenyl- methane (DADPM)	202-974-4	101-77-9	0.01	0.08	-	-	Sk Carc1B
1,2-Diaminoethane, see Ethylenediamine							
Diammonium peroxodisulphate (measured as [S ²⁰⁶]) See Persulphate salts							

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
Diatomaceous earth, natural, respirable dust	272-489-0	68855-54-9	-	1.2	-	-	-
Diazinon (ISO)	206-373-8	333-41-5	-	0.01 (IFV)	-	-	Sk
Diazomethane	206-382-7	334-88-3	0.2	0.4	-	-	Carc1B
Dibenzoyl peroxide	202-327-6	94-36-0	-	5	-	-	-
Dibismuth tritelluride, see Bismuth telluride							
Dibismuth tritelluride, selenium doped, see Bismuth telluride selenium doped							
Diborane	242-940-6	19287-45-7	0.1	0.1	-	-	-
Diboron trioxide, see Boron oxide							
Dibrom, see 1,2-Dibromo-2,2-dichloro ethyl dimethyl phosphate (Naled)							
1,2-Dibromo-2,2-dichloro ethyl dimethyl phosphate	206-098-3	300-76-5	-	0.1 (IFV)	-	6	-
Dibromodifluoromethane, see Difluorodibromomethane							
1,2-Dibromoethane, see Ethylene dibromide							
2-N-Dibutylaminoethanol	203-057-1	102-81-8	0.5	3.5	-	-	Sk
Dibutyl hydrogen phosphate	203-509-8	107-66-4	-	5 (IFV)	-	-	-
Dibutyl phenyl phosphate	219-772-7	2528-36-1	0.3	3.5	-	-	Sk
Di-n-butyl phosphate, see Dibutyl hydrogen phosphate							
Dibutyl phthalate	201-557-4	84-74-2	-	5	-	10	Repr1B
6,6'-di-tert-butyl-4,4'-thio-di-m-cresol	202-525-2	96-69-5	-	10 (I)	-	-	-
Dichloroacetylene		7572-29-4	-	-	0.1	0.4	-
1,2-Dichlorobenzene	202-425-9	95-50-1	20	122	50	306	Sk, IOELV
1,4-Dichlorobenzene	203-400-5	106-46-7	20	122	50	306	IOELV
3,3-Dichlorobenzidine	202-109-0	91-94-1	-	-	-	-	Carc1B
1,4-Dichloro-2-butene	212-121-8	764-41-0	0.005	0.025	-	-	Sk, Carc1B
Dichlorodifluoromethane	200-893-9	75-71-8	1000	4950	1250	6200	-
1,3-Dichloro-5,5-dimethyl-hydantoin	204-258-7	118-52-5	-	0.2	-	0.4	-
Dichlorodiphenyltrichloroethane, see 1,1,1'-Trichlorobis(chlorophenyl) ethane							
1,1-Dichloroethane	200-863-5	75-34-3	100	412	-	-	Sk, IOELV
1,2-Dichloroethane	203-458-1	107-06-2	5	20	10	40	Sk, Carc1B
1,1-Dichloroethylene	200-864-0	75-35-4	5	20	-	-	-
1,2-Dichloroethylene (cis:trans isomers 60:40), see Acetylene dichloride							
Dichloroethyl ether	203-870-1	111-44-4	5	29	10	58	Sk
Dichlorofluoromethane	200-869-8	75-43-4	10	40	-	-	-
Dichloromethane	200-838-9	75-09-2	50	174	150	550	Sk
2,2'-Dichloro-4,4'-methylene-dianiline (MbOCA), see 4,4'-Methylene bis-(2-chloroaniline)							
1,1-Dichloro-1-nitroethane	209-854-0	594-72-9	2	12	-	-	-
2,4-Dichlorophenoxyacetic acid [2,4-D (ISO)]	202-361-1	94-75-7	-	10	-	20	-

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
2-(2,4-dichlorophenoxy)ethyl hydrogen sulphate and sodium 2-(2,4dichlorophenoxy) ethyl sulphate	205-259-5	149-26-8	-	10	-	20	-
1,3-Dichloropropene, cis and trans isomers	208-826-5	542-75-6	1	5	10	50	Sk
Dichloropropionic acid	200-923-0	75-99-0	1	5.8	-	-	-
1,2-Dichlorotetrafluoroethane	200-937-7	76-14-2	1000	7000	1250	8750	-
Dichlorvos (ISO)	200-547-7	62-73-7	0.1	1	0.3	3	Sk
Dicrotophos	205-494-3	141-66-2	-	0.05 (IFV)	-	-	Sk
Dicyclohexyl phthalate	201-545-9	84-61-7	-	5	-	-	-
Dicyclopentadiene	201-052-9	77-73-6	5	30	-	-	-
Dicyclopentadienyl iron, see Ferrocene							
Dieldrin (ISO)	200-484-5	60-57-1	-	0.25	-	0.75	Sk
Diesel exhaust (particulate) (<0.1µm)	-	-	-	0.15	-	-	-
Diesel fuel/kerosene	-	-	-	100	-	-	-
Diethanolamine	203-868-0	111-42-2	-	1 (IFV)	-	-	-
Diethylamine	203-716-3	109-89-7	5	15	10	30	IOELV
2-Diethylaminoethanol	202-845-2	100-37-8	10	50	-	-	Sk
Diethylene glycol	203-872-2	111-46-6	23	100	-	-	-
Diethylene triamine	203-865-4	111-40-0	1	4	-	-	Sk
Diethyl ether, see Ether							
Di-(2-ethylhexyl) phthalate, see Di-sec-octyl-phthalate							
Diethyl ketone, see Pentan-3-one							
Diethyl phthalate	201-550-6		-	5	-	10	-
Diethyl sulphate	200-589-6	64-67-5	0.05	-	-	-	Sk, Carc1B, Muta1B
Difluorochloromethane	200-871-9	75-45-6	1000	3600	-	-	IOELV
Difluorodibromomethane	200-885-5	75-61-6	100	860	150	1290	-
Difluorodichloromethane, see Dichlorodifluoromethane							
Diglycidyl ether (DGE)	218-802-6	2238-07-5	0.01	0.05	-	-	-
Dihydrogen selenide (as Se)	231-978-9	7783-07-5	0.02	0.07	0.05	0.17	IOELV
m-Dihydroxybenzene, see Resorcinol							
o-Dihydroxybenzene, see Catechol							
p-Dihydroxybenzene, see Hydroquinone							
1,2-Dihydroxyethane, see 1,2-Ethane diol							
Diisobutyl ketone	203-620-1	108-83-8	25	150	-	-	-
Diisobutyl phthalate	201-553-2	84-69-5	-	5	-	-	-
Diisodecyl phthalate	247-977-1	26761-40-0	-	5	-	-	-
Diisononyl phthalate	249-079-5	28553-12-0	-	5	-	-	-
Diisooctyl phthalate	248-523-5	27554-26-3	-	5	-	-	-
Diisopropylamine	203-558-5	108-18-9	5	20	-	-	Sk
Diisopropyl ether, see Isopropyl ether							
Di-linear 79 phthalate	-	-	-	5	-	-	-
Dimethoxymethane, see Methylal							
N,N'-Dimethylacetamide	204-826-4	127-19-5	10	36	20	72	Repr1B, Sk, IOELV
Dimethylamine	204-697-4	124-40-3	2	3.8	5	9.4	IOELV

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
N,N-Dimethylaniline	204-493-5	121-69-7	5	25	10	50	Sk
1,3-Dimethylbutyl acetate	203-621-7	108-84-9	50	300	100	600	-
Dimethyl carbamoyl chloride	201-208-6	79-44-7	0.005	0.2	-	-	Carc1B
Dimethyl disulphide	210-871-0	624-92-0	0.5	1.9	-	-	-
Dimethyl ether	204-065-8	115-10-6	1000	1920	-	-	IOELV
N,N-Dimethylethylamine	209-940-8	598-56-1	10	30	15	45	-
Dimethylformamide	200-679-5	68-12-2	5	15	10	30	Sk, Repr1B,IOELV
2,6-Dimethylheptan-4-one, see Di-isobutyl ketone							
Dimethylhydrazine	200-316-0	57-14-7	0.01	0.02	-	-	Carc1B
Dimethyl phthalate	205-011-6	131-11-3	-	5	-	10	-
Dimethyl sulphate	201-058-1	77-78-1	0.1	0.5	0.1	0.5	Sk, Carc1B
Dimethyl sulphide	200-846-2	75-18-3	20	-	-	-	-
Dimethylethoxysilane	238-921-7	14857-34-2	0.5	-	1.5	-	-
Dinitolmide	205-706-4	148-01-6	-	5	-	-	-
Dinitrobenzene, all isomers	246-673-6	25154-54-5	0.15	1	0.5	3	Sk
Dinitro-o-cresol	208-601-1	534-52-1	-	0.2	-	0.6	Sk
Dinitrotoluene	246-836-1	25321-14-6	-	0.2	-	5	Carc1B, Sk
Dinonyl phthalate	201-560-0	84-76-4	-	5	-	-	-
1,4-Dioxane, tech. Grade	204-661-8	123-91-1	20	73	-	-	Sk, IOELV
Dioxathion (ISO)	201-107-7	78-34-2	-	0.1 (IFV)	-	-	Sk
1,3-Dioxolane	211-463-5	646-06-0	20	-	-	-	-
Diphenyl, see Biphenyl							
Diphenylamine	204-539-4	122-39-4	-	10	-	20	-
Diphenyl ether (vapour)	202-981-2	101-84-8	1	7	-	-	-
Diphosphorus pentoxide	215-236-1	1314-56-3	-	1	-	-	IOELV
Diphosphorus pentasulphide, see Phosphorus pentasulphide							
Dipotassium peroxodisulphate (measured as [S ^{2O₈²⁻]); see Persulphate salts, potassium}							
Dipropylene glycol methyl ether, see (2-Methoxymethyl ethoxy) -1-propanol							
Dipropyl ketone	204-608-9	123-19-3	50	233	-	-	-
Diquat dibromide(ISO)	201-579-4	85-00-7	-	0.5 (I) 0.1 (R)	-	-	-
Di-sec-octyl phthalate	204-211-0	117-81-7	-	5	-	10	Repr 1B
Disodium disulphite	231-673-0	7681-57-4	-	5	-	-	-
Disodium peroxodisulphate (measured as S2O8); see Persulphate salts, sodium							
Disodium tetraborate, anhydrous, decahydrate & pentahydrate, see Borates (tetra) sodium							
Disulfoton (ISO)	206-054-3	298-04-4	-	0.05 (IFV)	-	-	-
Disulphur dichloride, see Sulphur monochloride							
Disulphur decafluoride	227-204-4	5714-22-7	0.025	0.25	0.01	0.75	-
2,6-Ditertiary-butyl-para- cresol	204-881-4	128-37-0	-	10	-	-	-
Diuron (ISO)	206-354-4	330-54-1	-	10	-	-	-
Divanadium pentaoxide (as V), total inhalable fraction	215-239-8	1314-62-1	-	0.05	-	-	-
Divinylbenzene	203-595-7	108-57-6	10	50	-	-	-
DMDT, see Methoxychlor (ISO)							

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
Dodecyl mercaptan	203-984-1	112-55-0	0.1	-	-	-	
Dusts non-specific total inhalable respirable	-	-	-	10	-	-	-
Emery	-	1302-74-5	-	4	-	-	-
total inhalable dust respirable dust			-	10	-	-	-
Endosulfan (ISO)	204-079-4	115-29-7	-	4	-	-	-
Endrin (ISO)	200-775-7	72-20-8	-	0.1	-	0.3	Sk
Enflurane	237-553-4	13838-16-9	50	0.1	-	0.3	Sk
Epichlorohydrin	203-439-8	106-89-8	0.5	380	-	-	-
1,2-Epoxy-4-epoxyethylcyclohexane, see Vinylcyclohexene dioxide				2	1.5	6	Sk, Carc1B
2,3-Epoxypropyl isopropyl ether, see Isopropyl glycidyl ether							
Ethane (see aliphatic hydrocarbon gases)							
Ethane-1,2-diol, particulate vapour	203-473-3	107-21-1	-	10	-	-	Sk, IOELV
Ethanthiol	200-837-3	75-08-1	20	52	40	104	
Ethanol	200-578-6	64-17-5	0.5	1	2	3	-
Ethanolamine, see 2-Amino ethanol					1000	-	-
Ether	200-467-2	60-29-7	100	308	200	616	IOELV
2-Ethoxyethanol	203-804-1	110-80-5	2	8	-	-	Sk, Repr1B, IOELV
2-Ethoxyethyl acetate	203-839-2	111-15-9	2	11	-	-	Sk, Repr1B, IOELV
Ethyl acetate	205-500-4	141-78-6	200	-	400	-	-
Ethyl acrylate	205-438-8	140-88-5	5	20	10	41	Sk, IOELV
Ethyl alcohol, see Ethanol							
Ethylamine	200-834-7	75-04-7	5	9.4	-	-	IOELV
Ethyl amyl ketone, see 5-Methylheptan-3-one							
Ethylbenzene	202-849-4	100-41-4	100	442	200	884	Sk, IOELV
Ethyl bromide	200-825-8	74-96-4	5	22	-	-	Sk
Ethyl butyl ketone, see Heptan-3-one							
Ethyl chloride	200-830-5	75-00-3	100	268	-	-	IOELV
Ethyl chloroformate	208-778-5	541-41-3	1	4.4	-	-	-
Ethyl cyanoacrylate	230-391-5	7085-85-0	0.2	-	-	-	-
Ethylene	200-815-3	74-85-1	200	-	-	-	Asphx.
Ethylene chlorohydrin	203-459-7	107-07-3	-	-	1	3	Sk
Ethylenediamine	203-468-6	107-15-3	10	25	-	-	Sen
Ethylene dibromide	203-444-5	106-93-4	0.5	4	-	-	Sk, Carc1B
Ethylene dichloride, see 1,2-Dichloroethane							
Ethylene dinitrate, see Ethylene glycol dinitrate							
Ethylene glycol, particulate & vapour, see Ethane-1,2-diol							
Ethylene glycol dinitrate	211-063-0	628-96-6	0.05	0.3			Sk
Ethylene glycol monobutyl ether, see 2-Butoxyethanol							
Ethylene glycol monoethyl ether, see 2-Ethoxyethanol							

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
Ethylene glycol monomethyl ether acetate, see 2-Methoxyethyl acetate							
Ethylene glycol monomethyl ether, see 2-Methoxyethanol							
Ethylenimine	205-793-9	151-56-4	0.05	0.1	-	-	Sk, Carc 1B, Muta1B
Ethylene oxide	200-849-9	75-21-8	5	10	-	-	Carc1B, Muta1B
Ethyl ether, see Ether							
Ethyl formate	203-721-0	109-94-4	100	300	150	450	-
Ethyl hexanoic acid	205-743-6	149-57-5	-	4	-	-	-
2-Ethylhexyl chloroformate	246-278-9	24468-13-1	1	7.9	-	-	-
Ethylidene dichloride, see 1,1-Dichloroethane							
Ethyl mercaptan, see Ethanethiol							
4-Ethylmorpholine	202-885-0	100-74-3	5	23	20	95	Sk
Ethyl silicate	201-083-8	78-10-4	10	85	30	255	-
Fenchlorphos (ISO), see Ronnel							
Ferbam (ISO)	238-484-2	14484-64-1	-	5	-	-	-
Ferrovandium Dust	-	12604-58-9	-	1	-	3	-
Flour dust	-	-	-	1	-	-	Sen
Fluoride (as F)	-	16984-48-8	-	2.5	-	-	-
Fluorides, inorganic	-	-	-	2.5	-	-	IOELV
Fluorine	231-954-8	7782-41-4	1	1.58	2	3.16	IOELV
Fluorodichloromethane, see Dichlorofluoromethane							
Fluorotrichloromethane, see Trichlorofluoromethane							
Formaldehyde	200-001-8	50-00-0	2	2.5	2	2.5	
Formamide	200-842-0	75-12-7	10	18			Repr1B
Formic acid	200-579-1	64-18-6	5	9	-	-	IOELV
2-Furaldehyde (Furfural)	202-627-7	98-01-1	2	8	5	20	Sk
Furfuryl alcohol	202-626-1	98-00-0	5	20	15	60	Sk
Germane	231-961-6	7782-65-2	0.2	0.6	0.6	1.8	-
Germanium tetrahydride, see Germane							
Glutaraldehyde	203-856-5	111-30-8	-	-	0.05	0.2	Sen
Glycerol, mist	200-289-5	56-81-5	-	10	-	-	-
Glycerol trinitrate	200-240-8	55-63-0	0.05	0.5			Sk
Glycidol	209-128-3	556-52-5	2	6	-	-	Carc1B, Repr1B
Glycol mono ethyl ether, see 2-ethoxyethanol							
Grain dust	-	-	-	10	-	-	Sen
Graphite	231-153-3	7440-44-0					
total inhalable dust			-	10	-	-	-
respirable dust			-	4	-	-	-
Guthion	201-676-1	86-50-0	-	0.2	-	0.6	Sk
Gypsum		10101-41-4					
total inhalable dust			-	10	-	-	-
respirable dust			-	4	-	-	-
Halothane	205-796-5	151-67-7	10	80	-	-	-
γ-HCH (ISO), see γ Hexachlorocyclohexane							
Helium	231-168-5	7440-59-7	-	-	-	-	Asphx
Hafnium	231-166-4	7440-58-6	-	0.5	-	1.5	-
Heptachlor (ISO)	200-962-3	76-44-8	-	0.05	-	-	Sk

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
Heptachlor epoxide	213-831-0	1024-57-3		0.05			
n-Heptane	205-563-8	142-82-5	500	2085	-	-	IOELV
Heptan-2-one	203-767-1	110-43-0	50	238	100	475	Sk, IOELV
Heptan-3-one	203-388-1	106-35-4	20	95	-	-	IOELV
Hexachlorobutadiene	201-765-5	87-68-3	0.02	0.21	-	-	Sk
γ-Hexachlorocyclohexane	210-168-9	608-73-1	-	0.5	-	1.5	Sk
Hexachlorocyclopentadiene	201-029-3	77-47-4	0.01	0.1	-	-	-
Hexachloroethane vapour	200-666-4	67-72-1	1	10	-	-	-
Hexachloronaphthalene	215-641-3	1335-87-1	-	0.2	-	-	Sk
Hexafluoroacetone	211-676-3	684-16-2	0.1	0.68	-	-	Sk
Hexahydrophthalic anhydride	201-604-9	85-42-7	-	-	-	0.005	Sen
All isomers (Inhalable)	236-086-3	13149-00-3					
	238-009-9	14166-21-3					
Hexahydro-1,3,5-trinitro-1,3,5-triazine	204-500-1	121-82-4	0.5		-		Sk
Hexamethylene diisocyanate (as -NCO)	212-485-8	822-06-0	0.005		-		Sen
Hexane, all isomers except n-hexane	-	-	500	1800	1000	3600	-
n-Hexane	203-777-6	110-54-3	20	72	-	-	IOELV
1,6 Hexanediamine	204-679-6	124-09-4	0.5	2.3	-	-	-
1,6 Hexanolactam, dust & vapour: See ε-Caprolactam)							
Hexan-2-one	209-731-1	591-78-6	5	20	-	-	Sk
Hexone, see Methyl isobutyl ketone							
Hexylene glycol	203-489-0	107-41-5			25	125	-
Hydrazine	206-114-9	302-01-2	0.01	0.01	-	-	Sk, Carc1B
Hydrazoic acid (as vapour)	231-965-8	7782-79-8	-	-	0.1	-	-
Hydrogen	215-605-7	1333-74-0	-	-	-	-	Asphx.
Hydrogenated terphenyls	262-967-7	61788-32-7	0.5	4.9	-	-	-
Hydrogen bromide	233-113-0	10035-10-6	-	-	2	6.6	IOELV
Hydrogen chloride	231-595-7	7647-01-0	5	8	10	15	IOELV
Hydrogen cyanide	200-821-6	74-90-8	-	-	10	10	Sk
Hydrogen fluoride (as F)	231-634-8	7664-39-3	1.8	1.5	3	2.5	Sk, IOELV
Hydrogen peroxide	231-765-0	7722-84-1	1	1.5	2	3	-
Hydrogen selenide (as Se), see dihydrogen selenide							
Hydrogen sulphide	231-977-3	7783-06-4	5	7	10	14	IOELV
Hydroquinone	204-617-8	123-31-9		0.5			-
4-Hydroxy-4-methyl-pentan-2-one, see Diacetone alcohol							
2-Hydroxypropyl acrylate	213-663-8	999-61-1	0.5	3	-	-	Sk
2,2'-Iminodiethanol, see Diethanol amine							
2,2'-Iminodi (ethylamine), see Diethylene triamine							
Indene	202-393-6	95-13-6	5	24			-
Indium & Compounds (as In)	231-180-0	7440-74-6	-	0.1	-	0.3	-
INN, see 1,2-Dichlorotetrafluoroethane							
Iodine	231-442-4	7553-56-2	-	-	0.1	1	-
Iodoform	200-874-5	75-47-8	0.6	10	1	20	-
Iodomethane, see methyl iodide							
Iron oxide, fume (as Fe)	215-168-2	1309-37-1	-	5	-	10	-

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
Iron pentacarbonyl, see Pentacarbonyl iron (as Fe)							
Iron salts (as Fe)	-	-	-	1	-	2	-
Isoamyl acetate, see isopentyl acetate							
Isoamyl alcohol	204-633-5	123-51-3	100	360	125	450	-
Isoamyl methyl ketone	203-737-8	110-12-3	20	95	-	-	Sk, IOELV
Isobutyl acetate	203-745-1	110-19-0	150	700	187	875	-
Isobutyl alcohol	201-148-0	78-83-1	50	150	75	225	-
Isobutyl methyl ketone, see methyl isobutyl ketone							
Isocyanates (all, as -NCO)	-	-	-	0.02	-	0.07	Sen
Isoflurane	247-897-7	26675-46-7	50	380	-	-	-
Isoctyl alcohol (mixed isomers)	248-133-5	26952-21-6	50	270	-	-	-
Isopentyl acetate	204-662-3	123-92-2	50	260	100	520	IOELV
Isophorone, see 3,5,5-trimethyl cyclohex-2-enone							
Isophorone diisocyanate (IPDI) (as -NCO)	223-861-6	4098-71-9	0.005		-		Sen
Isopropoxyethanol	203-685-6	109-59-1	25	106	-	-	Sk
Isopropyl acetate	203-561-1	108-21-4	100	-	200	-	-
Isopropyl alcohol	200-661-7	67-63-0	200	-	400	-	Sk
Isopropylamine	200-860-9	75-31-0	5	12	10	24	-
n-Isopropylaniline	212-196-7	768-52-5	2	11	-	-	Sk
Isopropyl benzene	202-704-5	98-82-8	20	100	50	250	Sk, IOELV
Isopropyl chloroformate	203-563-2	108-23-6	1	5	-	-	-
Isopropyl ether	203-560-6	108-20-3	250	1050	310	1320	-
Isopropyl glycidyl ether (IGE)	223-672-9	4016-14-2	50	240	75	360	-
Kaolin, respirable dust		1332-58-7	-	2	-	-	-
Ketene	207-336-9	463-51-4	0.5	0.9	1.5	3	-
Lead (CAS No.:7439-92-1) and its compounds (except tetraethyl lead); [see Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 (S.I. No.619 of 2001)]	-	-	-	0.15	-	-	Repr1A, BOELV
Limestone, see Calcium carbonate							
Lindane, see γ hexachlorocyclohexane							
Liquefied petroleum gas (LPG)	270-704-2	68476-85-7	1000	1800	1250	2250	-
Lithium hydride	231-484-3	7580-67-8	-	0.025	-	-	IOELV
Lithium hydroxide	215-183-4	1310-65-2	-	-	-	1	-
Magnesium oxide respirable dust	215-171-9	1309-48-4	-	4	-	-	-
fume			-	5	-	10	-
total inhalable dust			-	10	-	-	-
Malathion (ISO)	204-497-7	121-75-5	-	1 (IFV)	-	-	Sk
Maleic anhydride	203-571-6	108-31-6	0.1	-	-	-	Sen
Manganese, fume (as Mn)	231-105-1	7439-96-5	-	0.2	-	3	-
Manganese and compounds (as Mn)	231-105-1	7439-96-5	-	0.2	-	-	-
Manganese cyclopentadienyl tricarbonyl	235-142-4	12079-65-1	-	0.1	-	0.3	Sk

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
Manganese tetraoxide, see Trimanganese tetraoxide							
Machinemade mineral fibre (excluding refractory ceramic fibres) (MMMf)	-	-	1 fibres per milli litre of air	5	-	-	-
Marble, see Calcium carbonate							
MbOCA, See 4,4'Methylenebis-(2-chloroaniline)							
MDA, see 4-4' -methylenedianiline							
MDI, see 4-4' -methylene-diphenyl diisocyanate							
Mequinol, see 4-methoxyphenol							
Mercaptoacetic acid	200-677-4	68-11-1	1	5	-	-	-
Mercury alkyls (as Hg)	-	-	-	0.01	-	0.03	Sk
Mercury & divalent inorganic mercury compounds	-	7439-97-6	-	0.02	-	-	IOELV
Mesitylene (also 1,3,5 trimethylbenzene)	203-604-4	108-67-8	20	100	-	-	IOELV
Mesityl oxide	205-502-5	141-79-7	15	60	25	100	-
Methacrylic acid	201-204-4	79-41-4	20	70	40	140	-
Methacrylonitrile	204-817-5	126-98-7	1	2.8	-	-	Sk
Methane (see aliphatic hydrocarbon gases)							
Methanethiol	200-822-1	74-93-1	0.5	1	-	-	-
Methanol	200-659-6	67-56-1	200	260	-	-	Sk, IOELV
Methomyl (ISO)	240-815-0	16752-77-5	-	2.5	-	-	Sk
Methoxychlor (ISO)	200-779-9	72-43-5	-	10	-	-	-
2-Methoxyethanol	203-713-7	109-86-4	1	-	-	-	Sk, Repr1B, IOELV
2-[2-Methoxyethoxy]ethanol	203-906-6	111-77-3	10	50.1	-	-	Sk, IOELV
2-Methoxyethyl acetate	203-772-9	110-49-6	1	-	-	-	Sk, Repr1B, IOELV
2-Methoxy-1-methylethylacetate	203-603-9	108-65-6	50	275	100	550	Sk, IOELV
[2-Methoxymethylethoxy]-l-propanol	252-104-2	34590-94-8	50	308	-	-	Sk, IOELV
4-Methoxyphenol	205-769-8	150-76-5	-	5	-	-	-
1-Methoxypropan-2-ol, see Propylene glycol monomethyl ether							
Methyl acetate	201-185-2	79-20-9	200	610	250	760	-
Methyl acetylene	200-828-4	74-99-7	1000	1610	-	-	-
Methyl acrylate	202-500-6	96-33-3	5	18	10	36	Sk, IOELV
Methylacrylonitrile, see methacrylonitrile							
Methylal	203-714-2	109-87-5	1000	3100	1250	3880	
Methyl alcohol, see Methanol							
Methylamine	200-820-0	74-89-5	5	6	15	19	-
Methyl-n-amy-l-ketone, see Heptan-2-one							
N-Methylaniline	202-870-9	100-61-8	0.5	2	-	-	Sk
Methyl bromide, See Bromomethane							
3-Methylbutan-1-ol, see Isoamyl alcohol							
1-Methyl butyl acetate	210-946-8	626-38-0	50	270	100	540	IOELV
Methyl chloride, See Chloromethane							
Methyl chloroform, see 1,1,1-trichloroethane							

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
Methyl 2-cyanoacrylate	205-275-2	137-05-3	0.2	1	0.3	1.4	-
Methylcyclohexane	203-624-3	108-87-2	400	1600			-
Methylcyclohexanol	247-152-6	25639-42-3	50	235	75	350	-
2-Methylcyclohexanone	209-513-6	583-60-8	50	230	75	345	Sk
Methylcyclopentadienyl manganese, tricarbonyl (as Mn), see Tricarbonyl (methylcyclopentadienyl) manganese							
2-Methyl-4, 6-dinitrophenol, see Dinitro- <i>o</i> -cresol							
4,4'-Methylenebis-(2-chloroaniline)	202-918-9	101-14-4	-	0.005	-	-	Sk, Carc1B
Methylene chloride, see Dichloromethane							
4,4'-Methylene-diphenyl diisocyanate (as -NCO)	202-966-0	101-68-8	-	0.02	-	0.07	Sen
4,4'-Methylenedianiline, see 4, 4'-Diaminodiphenyl-methane (DADPM)							
Methyl ethyl ketone (MEK)	201-159-0	78-93-3	200	600	300	900	Sk, IOELV
Methyl ethyl ketone peroxides (MEKP)	215-661-2	1338-23-4	-	-	0.2	1.5	-
Methyl ethyl ketoxime	202-496-6	96-29-7	3	10	10	33	-
Methyl formate	203-481-7	107-31-3	100	250	150	375	Sk
5-Methylheptan-3-one	208-793-7	541-85-5	10	53	20	107	IOELV
5-Methylhexan-2-one, see Isoamyl methyl ketone							
Methylhydrazine	200-471-4	60-34-4	0.01	0.02	-	-	Sk, Carc1B
Methyl iodide	200-819-5	74-88-4	2	11	5	28	Sk
Methyl isoamyl ketone, see Isoamyl methyl ketone							
Methyl isobutyl carbinol	203-551-7	108-11-2	25	100	40	160	Sk
Methyl isobutyl ketone (MIBK)	203-550-1	108-10-1	20	83	50	208	Sk, IOELV
Methyl isocyanate (as -NCO)	210-866-3	624-83-9	-	-	0.02	-	Sen, IOELV
Methyl isopropyl ketone	209-264-3	563-80-4	200	705	-	-	-
Methyl mercaptan, see Methanethiol							
Methyl methacrylate	201-297-1	80-62-6	50	-	100	-	IOELV
Methyl parathion, see Parathion-methyl (ISO)							
2-Methylpentane-2,4-diol, see Hexylene glycol							
4-Methylpentan-2-ol, see Methyl isobutyl carbinol							
4-Methylpentan-2-one, see Methyl isobutyl ketone							
4-Methylpent-3-en-2-one, see Mesityl oxide							
4-Methyl- <i>m</i> -phenylene diisocyanate (as -NCO)	-	-	-	0.02	-	0.07	Sen
2-Methylpropan-1-ol, see Iso-butyl alcohol							
2-Methylpropan-2-ol	200-889-7	75-65-0	100	300	150	450	-
Methyl propyl ketone, see Pentan-2-one							
1-Methyl-2-pyrrolidone	212-828-1	872-50-4	10	40	20	80-	Sk, IOELV
Methyl silicate	211-656-4	681-84-5	1	6	5	30	-

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
α- Methylstyrene, see 2-Phenylpropene							
Methylstyrene, all isomers	246-562-2	25013-15-4	50	242	10	483	-
N-Methyl-N, 2,4,6-tetranitro-aniline, see Tetryl							
Methyl vinyl ketone	201-160-0	78-94-4	0.2	-	-	-	Sk, Sen
Metribuzin	244-209-7	21087-64-9		5	-	-	-
Mevinphos (ISO)	232-095-1	7786-34-7	0.01	0.1	0.03	0.3	Sk
Mica	-	12001-26-2					
total inhalable dust			-	10	-	-	-
respirable dust			-	0.8	-	-	-
Mineral oil	-	-	-	-	-	-	-
Used in Metal working (Inhalable)			0.2				
Pure, Highly & Severely Refined (Inhalable)			5				
Mineral wool	-	-	2 fibres per millilitre of air	5	-	-	-
Molybdenum compounds (as Mo), soluble compounds	231-107-2	7439-98-7		0.5 (R)			
insoluble compounds				10 (I)			
				3 (R)			
Monochloroacetic acid	201-178-4	79-11-8	0.3	1	-	-	Sk
Monocrotophos	230-042-7	6923-22-4	-	0.25	-	-	Sk
Morpholine	203-815-1	110-91-8	10	36	20	72	Sk, IOELV
Naled (ISO), see 1,2 dibromo-2, 2 dichloro ethyl dimethyl phosphate							
Naphtha (rubber solvent)	232-443-2	8030-30-6			-	-	Carc1B
Naphthalene	202-049-5	91-20-3	10	50	15	75	IOELV
β-Naphthylamine	202-080-4	91-59-8	-	-	-	-	Carc1A
1,5-Naphthylene diisocyanate (as -NCO)							
	221-641-4	3173-72-6	-	-	-	-	Sen
Neon	231-110-9	7440-01-9	-	-	-	-	Asphx.
Nickel	231-111-4	7440-02-0	-	0.5	-	-	-
Nickel carbonyl	236-669-2	13463-39-3	0.05	0.12	0.1	0.24	Repr1B
Nickel, inorganic compounds (as Ni) soluble compounds				0.1			
insoluble compounds				0.5			
Nickel, organic compounds (as Ni)	-	-	-	1	-	3	-
Nicotine	200-193-3	54-11-5	-	0.5	-	-	Sk, IOELV
Nitrapyrin	217-682-2	1929-82-4	-	10	-	20	-
Nitric acid	231-714-2	7697-37-2	-	-	1	2.6	IOELV
Nitric oxide	233-271-0	10102-43-9	25	30	35	45	IOELV
4-Nitroaniline	202-810-1	100-01-6	-	3	-	-	Sk
Nitrobenzene	202-716-0	98-95-3	0.2	1	-	-	Sk, IOELV
4-Nitrodiphenyl	202-204-7	92-93-3	-	-	-	-	Sk, Carc1B
Nitroethane	201-188-9	79-24-3	100	310	-	-	-
Nitrogen	231-783-9	7727-37-9	-	-	-	-	Asphx
Nitrogen dioxide	233-272-6	10102-44-0	3	5	5	9	-
Nitrogen monoxide, See nitric oxide							
Nitrogen trifluoride	232-007-1	7783-54-2	10	30	15	45	-
Nitroglycerine, see Glycerol trinitrate							
Nitromethane	200-876-6	75-52-5	20	50			-
1-Nitropropane	203-544-9	108-03-2	25	90	-	-	-
2-Nitropropane	201-209-1	79-46-9	5	18	-	-	Carc1B

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
2-Nitrotoluene	201-853-3	88-72-2	2	11			Sk
3-Nitrotoluene	202-728-6	99-08-1					
4-Nitrotoluene	202-808-0	99-99-0					
Nitrous oxide	233-032-0	10024-97-2	50	90	-	-	-
Nonane, all isomers	203-913-4	111-84-2	200	1050	-	-	-
Octachloronaphthalene	218-778-7	2234-13-1	-	0.1	-	0.3	Sk
n-Octane	203-892-1	111-65-9	300	1450	375	1800	-
Orthophosphoric acid	231-633-2	7664-38-2	-	1	-	2	IOELV
Osmium tetroxide (as Os)	244-058-7	20816-12-0	0.0002	0.002	0.0006	0.006	-
Oxalic acid	205-634-3	144-62-7	-	1	-	-	IOELV
Oxalonnitrile, see Cyanogen							
2,2'-Oxydiethanol, see Diethylene glycol							
Oxygen difluoride	231-996-7	7783-41-7	0.05	0.11	0.05	0.11	-
Ozone	233-069-2	10028-15-6					
Heavy work			0.05	-	-	-	-
Moderate work			0.08	-	-	-	-
Light work			0.10	-	-	-	-
Heavy, moderate or light workloads (≤2 hrs)			0.20	-	-	-	-
Paracetamol, total inhalable dust	203-157-5	103-90-2	-	10	-	-	-
Paraffin wax, fume	232-315-6	8002-74-2	-	2	-	6	-
Paraquat dichloride (ISO) respirable dust	217-615-7	1910-42-5	-	0.08	-	-	-
Parathion (ISO)	200-271-7	56-38-2	-	0.1	-	0.3	Sk
Parathion-methyl (ISO)	206-050-1	298-00-0	-	0.02 (IFV)	-	-	Sk
Pentaborane	243-194-4	19624-22-7	0.005	0.01	0.015	0.039	-
Pentachloronaphthalene	215-320-8	1321-64-8	-	0.5	-	-	Sk
Pentachloronitrobenzene	201-435-0	82-68-8	-	0.5	-	-	-
Pentacarbonyl iron [as Fe]	236-670-8	13463-40-6	0.01	0.08	-	-	-
Pentachlorophenol	201-778-6	87-86-5	-	0.5	-	1.5	Sk
Pentaerythritol total inhalable dust	204-104-9	115-77-5	-	10	-	20	-
respirable dust			-	4	-	-	-
n-Pentane	203-692-4	109-66-0	1000	3000	-	-	IOELV
iso-Pentane	201-142-8	78-78-4					
neo-Pentane	207-343-7	463-82-1					
Pentan-2-one	203-528-1	107-87-9	200	700	250	875	-
Pentan-3-one	202-490-3	96-22-0	200	700	250	875	-
Pentyl acetate	211-047-3	628-63-7	50	270	100	540	IOELV
3-Pentylacetate	211-047-3	620-11-1	50	270	100	540	IOELV
Perchloroethylene, see Tetrachloroethylene							
Perchloromethyl mercaptan	209-840-4	594-42-3	0.1	0.76	-	-	-
Perchloryl fluoride	231-526-0	7616-94-6	3	14	6	28	-
Perfluoroisobutylene		382-21-8	0.01	0.082	0.01	0.082	-
Persulphate salts, inorganic;							
Ammonium persulphate	231-786-5	7727-54-0		0.1			Sen
Potassium persulphate	231-781-8	7727-21-1		0.1			Sen
Sodium persulphate	231-892-1	7775-27-1		0.1			Sen
Phenacyl chloride, see 2-Chloroacetophenone							
Phenol	203-632-7	108-95-2	2	8	4	16	Sk, IOELV
p-Phenylenediamine	203-404-7	106-50-3	-	0.1	-	-	Sk
Phenyl-2,3-epoxypropyl ether	204-557-2	122-60-1	0.1	0.6	-	-	Carc1B

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
Phenylethylene, see Styrene							
Phenyl glycidyl ether, see Phenyl-2,3-epoxypropyl ether							
Phenylhydrazine	202-873-5	100-63-0	0.1	0.44	-	-	Carc1B, Sk
Phenyl mercaptan, see Benzenethiol							
2-Phenylpropene	202-705-0	98-83-9	50	246	100	492	IOELV
Phorate (ISO)	206-052-2	298-02-2	-	0.05	-	0.2	Sk
Phosdrin, see Mevinphos (ISO)							
Phosgene	200-870-3	75-44-5	0.02	0.08	0.1	0.4	IOELV
Phosphine	232-260-8	7803-51-2	0.1	0.14	0.2	0.28	IOELV
Phosphoric acid, see Orthophosphoric acid							
Phosphorus, yellow	231-768-7	7723-14-0	-	0.1	-	0.3	-
Phosphorus, pentachloride	233-060-3	10026-13-8	-	1	-	-	IOELV
Phosphorus pentasulphide	215-242-4	1314-80-3	-	1	-	-	IOELV
Phosphorus trichloride	231-749-3	7719-12-2	0.2	1.5	0.5	3	-
Phosphoryl trichloride	233-046-7	10025-87-3	0.2	1.2	0.6	3.6	-
Phthalic anhydride	201-607-5	85-44-9	-	4	-	12	Sen
Picloram (ISO)	217-636-1	1918-02-1	-	10	-	20	-
Picric acid	201-865-9	88-89-1	-	0.1	-	0.3	Sk, IOELV
Piperazine	203-808-3	110-85-0	-	0.1	-	0.3	Sen, IOELV
Piperazine dihydrochloride	205-551-2	142-64-3	-	0.1	-	0.3	-
Piperidine	203-813-0	110-89-4	1	3.5	-	-	Sk
Plaster of Paris	-	26499-65-0					
total inhalable dust			-	10	-	-	-
respirable dust			-	4	-	-	-
Platinum metal	231-116-1	7440-06-4	-	1	-	-	IOELV
Platinum salts, soluble (as Pt)	231-116-1	7440-06-4	-	0.002	-	-	Sen
Polychlorinated biphenyls (PCBs), see Chlorinated biphenyls							
Polyvinyl chloride (PVC)	-	9002-86-2					
total inhalable dust			-	10	-	-	-
respirable dust			-	1	-	-	-
Portland Cement	266-043-4	65997-15-1					
Potassium hydroxide	215-181-3	1310-58-3	-	-	-	2	
Propane (see aliphatic hydrocarbon gases)							
Propane-1,2-diol	200-338-0	57-55-6					
total (vapour and particulates)			150	470	-	-	-
particulates			-	10	-	-	-
1,3-Propane sultone	214-317-9	1120-71-4	-	-	-	-	Carc1B
n-Propanol	200-746-9	71-23-8	100	-	-	-	Sk
Propan-1-ol see n-Propanol							
Propan-2-ol, see Isopropyl alcohol							
Propargyl alcohol, see Prop-2-yn-1-ol							
Propiolactone	200-340-1	57-57-8	0.5	1.5	-	-	Carc1B
Propionic acid	201-176-3	79-09-4	10	31	20	62	IOELV
Propoxur (ISO)	204-043-8	114-26-1	-	0.5	-	2	-
n-Propyl acetate	203-686-1	109-60-4	200	840	250	1050	-
n-Propyl alcohol, see n-Propanol							
Propylene	204-062-1	115-07-1	500	-	-	-	Asphx.
Propylene dinitrate (PGDN)	229-180-0	6423-43-4	0.05	0.3	-	-	Sk
Propylene dichloride	201-152-2	78-87-5	10	46	-	-	-
Propylene glycol, see propane-1,2-diol							

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
Propylene glycol dinitrate, see propylene dinitrate							
Propylene glycol monomethyl ether	203-539-1	107-98-2	100	375	150	568	IOELV
Propyleneimine	200-878-7	75-55-8	0.2	-	0.4	-	
Propylene oxide	200-879-2	75-56-9	5	12	-	-	Carc1B, Muta1B
n-Propyl nitrate	210-985-0	627-13-4	25	107	40	172	-
2-Propyn-1-ol	203-471-2	107-19-7	1	2	3	6	Sk
Pulverised fuel ash							
total inhalable dust	-	-	-	10	-	-	-
respirable	-	-	-	4	-	-	-
Pyrethrins (ISO)	232-319-8	8003-34-7	-	1	-	-	IOELV
Pyrethrum, see pyrethrins							
Pyridine	203-809-9	110-86-1	5	15	10	30	IOELV
2-Pyridylamine, see 2-Amino pyridine							
Pyrocatechol, see Catechol							
Quartz, respirable dust, (see Silica, crystalline)	238-878-4	14808-60-7	-	0.1	-	-	-
Quinone	203-405-2	106-51-4	0.1	0.4	0.3	1.2	-
RDX, see hexahydro-1,3,5-trinitro-1,3,5-triazine							
Refractory Ceramic Fibres (RCFs)	-	-	-	5mg/m ³ (1 fibre/ml)			Carc1B
Resorcinol	203-585-2	108-46-3	10	45	-	-	Sk, IOELV
Rhodium (as Rh), metal fume and dust	231-125-0	7440-16-6	-	0.1	-	0.3	-
soluble salts			-	0.001	-	0.003	-
Ronnel	206-082-6	299-84-3	-	5	-	-	-
Rosin core solder pyrolysis products (as airborne total resin acid)	-	-	-	0.05	-	0.15	Sen
Rotenone (ISO)	201-501-9	83-79-4	-	5	-	10	-
Rouge	215-168-2	1309-37-1					
total inhalable dust			-	10	-	-	-
respirable dust			-	4	-	-	-
Rubber							
fume	-	-	-	0.6	-	-	-
process dust	-	-	-	6	-	-	-
Rubber solvent (naphtha), see Naphtha (rubber solvent)							
Selenium and compounds, except hydrogen selenide(as Se)	231-957-4	7782-49-2	-	0.1	-	-	-
Selenium hexafluoride		7783-79-1	0.05	0.16	-	-	-
Sesone, see Sodium 2-(2,4-dichlorophenoxy) ethyl sulphate							
Silane	232-263-4	7803-62-5	0.5	0.7	1	1.5	-
Silica, amorphous							
total inhalable dust	-	-	-	6	-	-	-
respirable dust	-	-	-	2.4	-	-	-
Silica, crystalline, respirable dust, (See Cristobalite, Quartz, Tridymite, Tripoli)	-	-	-	0.1	-	-	-
Silica, fused respirable dust		60676-86-0		0.08			
Silicon Si	231-130-8	7440-21-3					
total inhalable dust			-	10	-	-	-
respirable dust			-	4	-	-	-

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
Silicon carbide	206-991-8	409-21-2	-	10	-	-	-
total inhalable dust			-	4	-	-	-
respirable dust							
Silicon tetrahydride, see Silane							
Silver (metallic)	231-131-3	7440-22-4	-	0.1	-	-	IOELV
Silver (soluble compounds as Ag)	-	-	-	0.01	-	-	IOELV
Sodium azide (as NaN ₃)	247-852-1	26628-22-8	-	0.1	-	0.3	Sk, IOELV
Sodium bisulfite	231-548-0	7631-90-5	-	5	-	-	-
Sodium 2-(2,4- dichlorphenoxy) ethyl sulphate	205-259-5	136-78-7	-	10	-	20	-
Sodium fluoroacetate	200-548-2	62-74-8	-	0.05	-	0.15	Sk
Sodium hydrogensulphite, see Sodium bisulfite							
Sodium hydroxide	215-185-5	1310-73-2	-	-	-	2	-
Sodium metabisulphite, see Disodium disulphite							
Starch	232-679-6	9005-25-8	-	10	-	-	-
total inhalable dust			-	4	-	-	-
respirable dust							
Stearates (except lead stearate)	-	-	-	10	-	-	-
Stibine		7803-52-3	0.1	0.5	0.3	1.5	-
Stoddard solvent	232-489-3	8052-41-3	100	573	-	-	-
Strontium chromate	232-142-6	7789-06-2	-	0.0005	-	-	Carc1B
Strychnine	200-319-7	57-24-9	-	0.15	-	0.45	-
Styrene	202-851-5	100-42-5	20	85	40	170	-
Subtilisins (proteolytic enzymes as 100% pure crystalline enzyme)	232-752-2	9014-01-1	-	0.00006	-	0.00006	Sen
Sucrose	200-334-9	57-50-1	-	10	-	20	-
Sulphotep (TEDP)(ISO), see 0,0,0',0'-Tetraethyl dithiopyrophosphate(ISO)							
Sulphur dioxide	231-195-2	7446-09-5	0.5	1.3	1	2.6	-
Sulphur hexafluoride	219-854-2	2551-62-4	1000	6000	1250	7500	-
Sulphuric acid 231-639-5	7664-93-9	-	0.05	-	-	IOELV	-
Sulphur monochloride	233-036-2	10025-67-9	-	-	1	6	-
Sulphur pentafluoride, see Disulphur decafluoride							
Sulphur tetrafluoride	232-013-4	7783-60-0	0.1	0.4	0.3	1	-
Sulphuryl difluoride	220-281-5	2699-79-8	5	20	10	40	-
Sulprofus	252-545-0	35400-43-2	-	0.1 (IFV)	-	-	-
2,4,5-T (ISO)2,4,5-Trichloro- phenoxyacetic acid)	202-273-3	93-76-5	-	10	-	20	-
TDI, see Toluene diisocyanate							
TEDP(ISO), see 0,0,0',0'-Tetraethyl dithiopyrophosphate							
TEPP (ISO), see 0,0,0',0'-Tetraethyl pyrophosphate							
TNT, see 2,4,6- trinitrotoluene							
Talc	238-877-9	14807-96-6	-	10	-	-	-
total inhalable dust			-	0.8	-	-	-
respirable dust							
Tantalum	231-135-5	7440-25-7	-	5	-	10	-
Tellurium & compounds, except hydrogen telluride, (as Te)	236-813-4	13494-80-9	-	0.1	-	-	-
Temephos	222-191-1	3383-96-8	-	1	-	-	-

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
Terephthalic acid	202-830-0	100-21-0	-	10	-	-	-
Terphenyls, all isomers	247-477-3	26140-60-3	-	-	0.5	5	-
1,1,2,2-Tetrabromoethane	201-191-5	79-27-6	0.1 (ifv)		-	-	Sk
Tetrabromomethane, see Carbon tetrabromide							
Tetracarbonylnickel(as Ni), see nickel carbonyl							
1,1,1,2-Tetrachloro-2,2-difluoroethane	200-934-0	76-11-9	100	834	100	834	-
1,1,1,2-Tetrachloro-1,2-difluoroethane	200-935-6	76-12-0	50	417			-
1,1,2,2, Tetrachloroethane	201-197-8	79-34-5	1	6.9	-	-	Sk
Tetrachloroethylene	204-825-9	127-18-4	25	170	100	678	-
Tetrachloromethane, see carbon tetrachloride							
Tetrachloronaphthalenes, all isomers	215-642-9	1335-88-2	-	2	-	4	-
O,O,O',O'- Tetraethyl dithio- pyrophosphate(ISO)	222-995-2	3689-24-5	-	0.1	-	-	Sk, IOELV
O,O,O',O'-Tetraethyl pyrophosphate (ISO)	203-495-3	107-49-3	0.0008	0.01			Sk
Tetraethyl lead	201-075-4	78-00-2	-	0.10	-	-	Sk, Repr1A
Tetraethyl orthosilicate, see Ethyl silicate							
Tetrafluorodichloroethane, see 1,2-Dichlorotetrafluoro-ethane							
Tetrahydrofuran	203-726-8	109-99-9	50	150	100	300	Sk, IOELV
Tetramethyl lead	200-897-0	75-74-1	-	0.15	-	-	Sk
Tetramethyl orthosilicate, see Methyl silicate							
Tetramethyl succinonitrile		3333-52-6	0.5	3	2	9	Sk
Tetranitromethane	208-094-7	509-14-8	0.005	0.040	-	-	-
Tetrasodium pyrophosphate	231-767-1	7722-88-5	-	5	-	-	-
Tetryl	207-531-9	479-45-8	-	1.5	-	3	Sk
Thallium, soluble compounds (as Tl)	231-138-1	7440-28-0	-	0.1	-	-	Sk
4,4'-Thiobis (6-tert- butyl-m-cresol) , see 6,6'-di-tert-butyl-4,4'- thio-di-m-cresol							
Thioglycollic acid, see Mercapto acetic acid							
Thionyl chloride	231-748-8	7719-09-7	-	-	0.5	2.4	-
Thiram (ISO)	205-286-2	137-26-8	-	0.05 (IFV)	-	-	-
Tin, as Sn	231-141-8	7440-31-5 & others	-		-		IOELV
Metal				2			
Oxide & inorganic compounds, except tin hydride				2			
Organic compounds				0.1		0.2	
Titanium dioxide total inhalable dust	236-675-5	13463-67-7	-	10	-	-	-
respirable dust			-	4	-	-	-
o-Tolidine	204-358-0	119-93-7	-	-	-	-	Sk Carc1B
Toluene	203-625-9	108-88-3	50	192	100	384	Sk, IOELV

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
Toluene-2,4- or 2,6- diisocyanate (as -NCO)	209-544-5	584-84-9 91-08-7	0.001 (IFV)		0.003 (IFV)		Sen
p-Toluenesulphonyl chloride	202-684-8	98-59-9	-	-	-	5	-
o-Toluidine	202-429-0	95-53-4	0.2	0.9	-	-	Sk Carc1B
m-Toluidine	203-583-1	108-44-1	0.2	0.9	-	-	Sk
p-Toluidine	203-403-1	106-49-0	0.2	0.9	-	-	Sk
1,4,7-Tri-[aza]-heptane, see Diethylene triamine							
Tribromomethane	200-854-6	75-25-2	0.5	5	-	-	Sk
Tributyl phosphate, all isomers	204-800-2	126-73-8	0.2		-		-
Tricarbonyl (etacyclopenta- dienyl) manganese (as Mn), see Manganese cyclopentadienyl tricarbonyl							
Tricarbonyl (methylcyclopentadienyl) manganese (as Mn),	235-166-5	12108-13-3	-	0.2	-	0.6	Sk
Trichloroacetic acid	200-927-2	76-03-9	1	5	-	-	-
1,2,4-Trichlorobenzene	204-428-0	120-82-1	2	15.1	5	37.8	Sk, IOELV
1,1,1-Trichlorobis (chlorophenyl) ethane	200-024-3	50-29-3	-	1	-	3	-
1,1,1-Trichloroethane	200-756-3	71-55-6	100	555	200	1110	IOELV
1,1,2-Trichloroethane	201-166-9	79-00-5	10	45	20	90	Sk
Trichloroethylene	201-167-4	79-01-6	10		25		Sk, Carc1B
Trichlorofluoromethane	200-892-3	75-69-4	1000	5600	1250	7000	-
Trichloromethane, see Chloroform							
Trichloronaphthalene	215-321-3	1321-65-9	-	5	-	-	Sk
Trichloronitromethane, see Chloropicrin							
2,4,5-Trichlorophenoxyacetic acid ([2,4,5-T(ISO)])	202-273-3	93-76-5	-	10	-	20	-
1,2,3-Trichloropropane	202-486-1	96-18-4	10	60			-
1,1,2-Trichlorotri-fluoroethane	200-936-1	76-13-1	1000	7600	1250	9500	-
Tri-o-cresyl phosphate, see Tri-o-tolyl phosphate							
Tricyclohexyltin hydroxide	236-049-1	13121-70-5	-	5	-	10	-
Tridymite, respirable dust (see Silica, Crystalline)	239-487-1	15468-32-3	-	0.1	-	-	-
Triethanolamine	203-049-8	102-71-6	-	5	-	-	-
Triethylamine	204-469-4	121-44-8	2	8.4	3	12.6	Sk, IOELV
Trifluorobromomethane	200-887-6	75-63-8	1000	6100	1200	7300	-
Triglycidyl isocyanurate, TGIC	219-514-3	2451-62-9	-	0.05	-	-	Muta1B
Trimanganese tetroxide	215-266-5	1317-35-7	-	0.5	-	-	-
Trimellitic anhydride	209-008-0	552-30-7	-	0.0005	-	0.002	Sen
Trimethylamine	200-875-0	75-50-3	5				-
1,2,3 - Trimethylbenzene	208-394-8	526-73-8	20	100	-	-	Sk, IOELV
1,2,4 - Trimethylbenzene	202-436-9	95-63-6	20	100	-	-	IOELV
Trimethylbenzenes, all isomers or mixtures	247-099-9	25551-13-7	20	100	-	-	Sk, IOELV
3,5,5-Trimethylcyclohex-2-enone	201-126-0	78-59-1	-	-	5	25	-
Trimethyl phosphite	204-471-5	121-45-9	2	10	-	-	-
2,4,6-Trinitrophenol, see Picric acid							
2,4,6-Trinitrotoluene	204-289-6	118-96-7	-	0.1	-	-	Sk
Triorthocresyl phosphate, see Tri-o-tolyl phosphate,							
Triphenylamine	210-035-5	603-34-9	-	5	-	-	-

Substance	EINECS No.	CAS No.	Occupational Exposure Limit Value (8-hour reference period)		Occupational Exposure Limit Value (15-minute reference period)		Notes
			ppm	mg/ m ³	ppm	mg/ m ³	
Triphenyl phosphate	204-112-2	115-86-6	-	3	-	6	-
Tripoli, respirable dust (see Silica, Crystalline)		1317-95-9	-	0.1	-	-	-
Tri-o-tolyl phosphate	201-103-5	78-30-8	-	0.1	-	0.3	-
Tungsten & compounds (as W), soluble	231-143-9	7440-33-7	-	1	-	3	-
insoluble			-	5	-	10	-
Turpentine	232-350-7	8006-64-2	20	112	150	840	-
Uranium compounds, natural, soluble, (as U)	231-170-6	7440-61-1	-	0.2	-	0.6	-
n-Valeraldehyde	203-784-4	110-62-3	50	176	-	-	-
Vanadium pentoxide, see Divanadium pentaoxide							
Vinyl acetate	203-545-4	108-05-4	5	18	10	35	IOELV
Vinyl benzene, see styrene							
Vinyl bromide	209-800-6	593-60-2	0.5	2.2	-	-	Carc1B
Vinyl chloride(VCM)	200-831-0	75-01-4	3	7.77	-	-	Carc1A, BOELV
4-Vinylcyclohexene	202-848-9	100-40-3	0.1	0.4	-	-	-
4-Vinylcyclohexene dioxide	203-437-7	106-87-6	0.1	0.6	-	-	-
Vinyl fluoride	200-832-6	75-02-5	1	-	-	-	-
Vinylidene chloride, see 1,1-Dichloroethylene							
Vinylidene fluoride	200-867-7	75-38-7	500	-	-	-	-
Vinyl pyrrolidone	201-800-4	88-12-0	-	0.05	-	-	-
Vinyl toluene, all isomers, see Methylstyrene							
VM and P Naptha	232-453-7	8032-32-4	-	-	-	-	Carc1B
Warfarin (ISO)	201-377-6	81-81-2	-	0.1	-	0.3	Repr1A
Welding fume	-	-	-	5	-	-	-
White spirit, see Stoddard solvent							
Wood dust, (soft wood)	-	-	-	5	-	-	Sen
Wood dust, (hard wood)	-	-	-	5	-	-	Sen, BOELV
Xylene, mixed isomers	215-535-7	1330-20-7	50	221	100	442	Sk, IOELV
Xylene, o-isomer	202-422-2	95-47-6	50	221	100	442	Sk, IOELV
Xylene m-isomer	203-576-3	108-38-3	50	221	100	442	Sk, IOELV
Xylene p-isomer	203-396-5	106-42-3	50	221	100	442	Sk, IOELV
Xylidine, all isomers	215-091-4	1300-73-8	0.5 (IFV)	2.5	-	-	Sk
Yttrium	231-174-8	7440-65-5	-	1	-	3	-
Zinc chloride, fume	231-592-0	7646-85-7	-	1	-	2	-
Zinc chromates	236-878-9	13530-65-9	-	0.01	-	-	Carc1A
Zinc distearate	209-151-9	557-05-1	-	-	-	-	-
total inhalable dust			-	10	-	20	-
respirable dust			-	4	-	-	-
Zinc oxide, fume	215-222-5	1314-13-2	-	2 (R)	-	10	-
Zirconium compounds (as Zr)	231-176-9	7440-67-7	-	5	-	10	-

➤ Italy⁹⁰

EINECS ⁽¹⁾	CAS ⁽²⁾	NOME DELL'AGENTE CHIMICO	VALORE LIMITE				NOTAZIONE ⁽³⁾
			8 ore ⁽⁴⁾		Breve Termine ⁽⁵⁾		
			mg/m ³ ⁽⁶⁾	ppm ⁽⁷⁾	mg/m ³ ⁽⁶⁾	ppm ⁽⁷⁾	
200-467-2	60-29	Dietiletere	308	100	616	200	-
200-662-2	67-64-1	Acetone	1210	500	-	-	-
200-663-8	67-66-3	Cloroformio	10	2	-	-	Pelle
200-756-3	71-55-6	Tricloroetano, 1,1,1-	555	100	1110	200	-
200-834-7	75-04-7	Etilammina	9,4	5	-	-	-
200-863-5	75-34-3	Dicloroetano, 1,1-	412	100	-	-	Pelle
200-870-3	75-44-5	Fosgene	0,08	0,02	0,4	0,1	-
200-871-9	75-45-6	Clorodifluorometano	3600	1000	-	-	-
201-159-0	78-93-3	Butanone	600	200	900	300	-
201-176-3	79-09-4	Acido propionico	31	10	62	20	-
202-422-2	95-47-6	o-Xilene	221	50	442	100	Pelle
202-425-9	95-50-1	Diclorobenzene, 1, 2-	122	20	306	50	Pelle
202-436-9	95-63-6	Trimetilbenzene, 1, 2, 4	100	20	-	-	-
202-704-5	98-82-8	Cumene	100	20	250	50	Pelle
202-705-0	98-83-9	Fenilpropene, 2-	246	50	492	100	-
202-849-4	100-41-4	Etilbenzene	442	100	884	200	Pelle
203-313-2	105-60-2	e-Caprolattame (polveri e vapori) ⁸⁾	10	-	40	-	-
203-388-1	106-35-4	Eptan-3-one	95	20	-	-	-
203-396-5	106-42-3	p-Xilene	221	50	442	100	Pelle
203-400-5	106-46-7	Diclorobenzene, 1,4-	122	20	306	50	-
203-470-7	107-18-6	Alcole allilico	4,8	2	12,1	5	Pelle
203-473-3	107-21-1	Etilen glicol	52	20	104	40	Pelle
203-539-1	107-98-2	Metossipropanolo-2,1-	375	100	568	150	Pelle
203-550-1	108-10-1	Metilpentan-2-one,4-	83	20	208	50	-
203-576-3	108-38-3	m-Xilene	221	50	442	100	Pelle
203-603-9	108-65-6	2-Metossi-1-metiletilacetato	275	50	550	100	Pelle
203-604-4	108-67-8	Mesitilene (1,3,5-trimetilbenzene)	100	20	-	-	-
203-628-5	108-90-7	Clorobenzene	47	10	94	20	-
203-631-1	108-94-1	Cicloesanone	40,8	10	81,6	20	Pelle
203-632-7	108-95-2	Fenolo	7,8	2	-	-	Pelle
203-726-8	109-99-9	Tetraidrofurano	150	50	300	100	Pelle
203-737-8	110-12-3	5-metilesan-2-one	95	20	-	-	-
203-767-1	110-43-0	eptano-2-one	238	50	475	100	Pelle
203-808-3	110-85-0	Piperazina (polvere e vapore) ⁸⁾	0,1	-	0,3	-	-
203-905-0	111-76-2	Butossietanolo-2	98	20	246	50	Pelle
203-933-3	112-07-2	2-Butossietilacetato	133	20	333	50	Pelle
204-065-8	115-10-6	Etile dimetilico	1920	1000	-	-	-
204-428-0	120-82-1	1,2,4-Triclorobenzene	15,1	2	37,8	5	Pelle
204-469-4	121-44-8	Trietilammina	8,4	2	12,6	3	Pelle
204-662-3	123-92-2	Acetato di isoamile	270	50	540	100	-
204-697-4	124-40-3	Dimetilammina	3,8	2	9,4	5	-
204-826-4	127-19-5	N,N-Dimetilacetammide	36	10	72	20	Pelle
205-480-7	141-32-2	Acrilato di n-butile	11	2	53	10	-
205-563-8	142-82-5	Eptano, n-	2085	500	-	-	-
208-394-8	526-73-8	1,2,3-Trimetilbenzene	100	20	-	-	-
208-793-7	541-85-5	5-Metileptano-3-one	53	10	107	20	-
210-946-8	626-38-0	Acetato di 1-metilbutile	270	50	540	100	-
211-047-3	628-63-7	Acetato di pentile	270	50	540	100	-
	620-11-1	Acetato di 3-amile	270	50	540	100	-
	625-16-1	Acetato di terz-amile	270	50	540	100	-
215-535-7	1330-20-7	Xilene, isomeri misti, puro	221	50	442	100	Pelle
222-995-2	3689-24-5	Sulfotep	0,1	-	-	-	Pelle
231-634-8	7664-39-3	Acido fluoridrico	1,5	1,8	2,5	3	-
231-131-3	7440-22-4	Argento, metallico	0,1	-	-	-	-
231-595-7	7647-01-0	Acido cloridrico	8	5	15	10	-
231-633-2	7664-38-2	Acido ortofosforico	1	-	2	-	-

⁹⁰ Ministero del Lavoro e delle Politiche Sociali – Ministero della Salute, **2008**, Criteri di qualificazione della figura del formatore per la salute e sicurezza sul lavoro, articolo 6, comma 8, lett. m-bis, del Decreto Legislativo n. 81/2008 e s.m.i., Allegato XXXVIII.

EINECS ⁽¹⁾	CAS ⁽²⁾	NOME DELL'AGENTE CHIMICO	VALORE LIMITE				NOTAZIONE ⁽³⁾
			8 ore ⁽⁴⁾		Breve Termine ⁽⁵⁾		
			mg/m ³ (6)	ppm (7)	mg/m ³ (6)	ppm (7)	
231-635-3	7664-41-7	Ammoniaca anidra	14	20	36	50	-
231-945-8	7782-41-4	Fluoro	1,58	1	3,16	2	-
231-978-9	7782-41-4	Seleniuro di idrogeno	0,07	0,02	0,17	0,05	-
233-113-0	10035-10-6	Acido bromidrico	-	-	6,7	2	-
247-852-1	26628-22-8	Azoturo di sodio	0,1	-	0,3	-	Pelle
252-104-2	34590-94-8	(2-Metossimetilotossi)-propanolo	308	50	-	-	Pelle
		Fluoruri inorganici (espressi come F)	2,5	-	-	-	-
		Piombo inorganico e suoi composti	0,15	-	-	-	-
200-193-3	54-11-5	Nicotina	0,5	—	—	—	Pelle
200-579-1	64-18-6	Acido formico	9	5	—	—	—
200-659-6	67-56-1	Metanolo	260	200	—	—	Pelle
200-830-5	75-00-3	Cloroetano	268	100	—	—	Pelle
200-835-2	75-05-8	Acetonitrile	35	20	—	—	Pelle
201-142-8	78-78-4	Isopentano	2 000	667	—	—	—
202-716-0	98-95-3	Nitrobenzene	1	0,2	—	—	Pelle
203-585-2	108-46-3	Resorcinolo	45	10	—	—	Pelle
203-625-9	108-88-3	Toluene	192	50	—	—	Pelle
203-628-5	108-90-7	Monoclorobenzene	23	5	70	15	—
203-692-4	109-66-0	Pentano	2 000	667	—	—	—
203-716-3	109-89-7	Dietilammina	15	5	30	10	—
203-777-6	110-54-3	n-Esano	72	20	—	—	—
203-806-2	110-82-7	Cicloesano	350	100	—	—	—
203-815-1	110-91-8	Morfolina	36	10	72	20	Pelle
203-906-6	111-77-3	2-(2-Metossietossi)etanolo	50,1	10	—	—	Pelle
203-961-6	112-34-5	2-(2-Butossietossi)etanolo	67,5	10	101,2	15	—
204-696-9	124-38-9	Anidride carbonica	9 000	5 000	—	—	—
205-483-3	141-43-5	2-Amminoetanolo	2,5	1	7,6	3	Pelle
205-634-3	144-62-7	Acido ossalico	1	—	—	—	—
206-992-3	420-04-2	Cianammide	1	—	—	—	Pelle
207-343-7	463-82-1	Neopentano	3000	1000	—	—	—
215-236-1	1314-56-3	Pentaossido di fosforo	1	—	—	—	—
215-242-4	1314-80-3	Pentossido di difosforo	1	—	—	—	—
231-131-3		Argento (composti solubili come Ag)	0,01	—	—	—	—
		Bario (composti solubili come Ba)	0,5	—	—	—	—
		Cromo metallico, composti di cromo inorganico (II) e composti di cromo inorganico (III) (non solubili)	0,5	—	—	—	—
231-714-2	7697-37-2	Acido nitrico	—	—	2,6	1	—
231-778-1	7726-95-6	Bromo	0,7	0,1	—	—	—
231-959-5	7782-50-5	Cloro	—	—	1,5	0,5	—
232-260-8	7803-51-2	Fosfina	0,14	0,1	0,28	0,2	—
	8003-34-7	Piretro (depurato dai lattoni sensibilizzanti)	1	—	—	—	—
233-060-3	10026-13-8	Pentacloruro di fosforo	1	—	—	—	—

(1) EINECS: Inventario europeo delle sostanze chimiche esistenti a carattere commerciale.

(2) CAS: Chemical Abstract Service Registry Number (Numero del registro del Chemical Abstract Service).

(3) Notazione cutanea attribuita ai LEP che identifica la possibilità di un assorbimento significativo attraverso la Pelle.

(4) Misurato o calcolato in relazione ad un periodo di riferimento di otto ore, come media ponderata.

(5) Un valore limite al di sopra del quale l'esposizione non deve avvenire e si riferisce ad un periodo di 15 minuti, salvo indicazione contraria.

(6) mg/m³: milligrammi per metro cubo di aria a 20 °C e 101,3 kPa.

(7) ppm: parti per milione nell'aria (ml/m³).

➤ Netherlands⁹¹

Agens	Advies- waarde	Termijn ²	Eenheid	Paragraaf
Chemische agentia				
1,1,1,- Trichloorethaan	380		µg/m ³	2.2.4
1,2-Dichloorethaan	48		µg/m ³	2.2.4
1,2-Dichloorpropaan	12		µg/m ³	2.2.4.
1,4-Dichloorbenzeen	670		µg/m ³	2.2.5
Alkanen ³ : Som van pentaan, heptaan, octaan	18400		µg/m ³	2.2.3
Alkanen; Hogere alkanen (nonaan en hoger)	1000		µg/m ³	2.2.3
Alkylbenzenen ⁴ : Som van Isopropylbenzeen, Trimethylbenzeen, Methylethylbenzeen, n-Propylbenzeen, n-butylbenzeen	870		µg/m ³	2.2.1
Alkyldimethylbenzyl-ammoniumchloride	-			2.3
Abest	100.000		ve/m ³	2.5
Benzeen	20		µg/m ³	2.2.1
Chloorbenzeen	500		µg/m ³	2.2.5
Chloorpyrifos	3		µg/m ³	2.3
Cyclohexaan	3000		µg/m ³	2.2.3
Dichloormethaan	3000		µg/m ³	2.2.4
Didecyldimethyl- ammoniumchloride	-			2.3
Ethylbenzeen	770		µg/m ³	2.2.1
Fijn stof (PM ₁₀)	-			2.1.
Formaldehyde ⁵	1,2		µg/m ³	2.2.2
Foxim	-			2.3
HABS ⁶	800		µg/m ³	2.2.1
Hexaan	200		µg/m ³	2.2.3
Kooldioxide (CO ₂)	-			5.1
Koolmonoxide (CO)	100	15 minuten	mg/m ³	2.1
	60	30 minuten	mg/m ³	
	30	1 uur	mg/m ³	
	10	8 uur	mg/m ³	
Kwikdamp	50	jaargemiddelde	ng/m ³	2.4
Lood	500	jaargemiddelde	ng/m ³	2.4
Minerale vezels	100.000	jaargemiddelde	ve/m ³	2.5
Ozon	120	8 uur	µg/m ³	2.1
PAK	1,2		ng B(a)P/m ³	2.1
Propoxur	22		µg/m ³	2.3
Stikstofdioxide (NO ₂)	200	1 uur	µg/m ³	2.1
	40	jaargemiddelde	µg/m ³	
Styreen	900		µg/m ³	2.2.1
Tetrachlooretheen (per)	250		µg/m ³	2.2.4
Tetramethrin	-			2.3

⁹¹Minister van Sociale Zaken en Werkgelegenheid, 2016, Arbeidsomstandighedenregeling. Available at <http://wetten.overheid.nl/BWBR0008587/20160401/0/afdrukken>

Agens	Advies- waarde	Termijn ²	Eenheid	Paragraaf
Tolueen	400		µg/m ³	2.2.1
Trichloorbenzeen	50		µg/m ³	2.2.5
Trichlooretheen (tri)	200		µg/m ³	2.2.4
Trichloorfon	-			2.3
Trichloormethaan (chloroform)	100		µg/m ³	2.2.4
Xyleen	870		µg/m ³	2.2.1
Zwavel dioxide (SO ₂)	500 125 50	10 minuten 24uur jaargemiddelde	µg/m ³ µg/m ³ µg/m ³	2.1
Fysische agentia/ventilatie				
Geluid	35 30	Dag: 16 uur Nacht: 8 uur	LAEq (dB) LAEq (dB)	3.3
NIS (Niet Ioniserende Straling)	-			3.3.2.
Radon	-			3.3.1
Temperatuur	-			3.1
Ventilatie	-			5.2
Ventilatievoud	-			5.2
Vocht	-			3.2
Biologische agentia				
Schimmels	-			4.1
Schimmelcomponenten				4.2
β(1→3)-glucanen	-			4.2.1.
Allergenen	-			4.2.2.
Mycotoxinen	-			4.2.3.
Microbiële VOC's	-			4.2.4.
Bacteriën	-			4.3.
Bacteriële componenten				4.4
Endotoxinen	-			4.4.1
Peptidoglycanen	-			4.4.2
Huisstofmijtallergenen	-			4.5.
Huisdier- en kakkerlak allergenen	-			4.6.

➤ Spain⁹²

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS VLA-ED		LÍMITES ADOPTADOS VLA-EC		NOTAS	FRASES R
			ppm	mg/m ³	ppm	mg/m ³		
		Aceite mineral refinado, nieblas		5		10	am	
		Aceite vegetal, nieblas		10			a, véase Apartado 9	
200-836-8	75-07-0	Acetaldehído			25	46		12-36/37-40
211-047-3	628-63-7	Acetato de n-amilo	50	270	100	540	VLI	10-66
210-946-8	626-38-0	Acetato de sec-amilo	50	270	100	540	VLI	10-66
	625-16-1	Acetato de terc-amilo	50	270	100	540	VLI	
205-399-7	140-11-4	Acetato de bencilo	10	62				
204-658-1	123-86-4	Acetato de n-butilo	150	724	200	965		10-66-67
203-300-1	105-46-4	Acetato de sec-butilo	200	966				11-66
208-760-7	540-88-5	Acetato de terc-butilo	200	966				11- 66
203-933-3	112-07-2	Acetato de 2-butoxietilo	20	133	50	333	vía dérmica, VLI	20/21
		Acetato del éter monobutílico del etilenglicol			véase Acetato de 2-butoxietilo			
		Acetato del éter monoetilico del etilenglicol			véase Acetato de 2-etoxietilo			
		Acetato del éter monometílico del etilenglicol			véase Acetato de 2-metoxietilo			
		Acetato de etilenglicol monopropileter			véase Acetato de 2-propoxietilo			
205-500-4	141-78-6	Acetato de etilo	400	1.460				11- 36-66-67
203-839-2	111-15-9	Acetato de 2-etoxietilo	5	27			vía dérmica, TR2, VLB	60-61-20/21/22
203-621-7	108-84-9	Acetato de sec-hexilo	50	300				
204-662-3	123-92-2	Acetato de isoamilo	50	270	100	540	VLI	10-66

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS VLA-ED		LÍMITES ADOPTADOS VLA-EC		NOTAS	FRASES R
			ppm	mg/m ³	ppm	mg/m ³		
203-745-1	110-19-0	Acetato de isobutilo	150	724				11- 66
203-561-1	108-21-4	Acetato de isopropilo	100	425	200	850		11-36-66-67
210-843-8	624-41-9	Acetato de 2-metilbutilo	50	270	100	540		10- 66
203-603-9	108-65-6	Acetato de 1-metil-2-metoxietilo	50	275	100	550	vía dérmica, VLI	10-36
201-185-2	79-20-9	Acetato de metilo	200	616	250	770		11- 36- 66-67
203-772-9	110-49-6	Acetato de 2-metoxietilo	5	24			vía dérmica, TR2, véase Apartado 9	60-61-20/21/22
274-724-2	70657-70-4	Acetato de 2-metoxipropilo	5	28	40	220	TR2,r	61-10-37
	620-11-1	Acetato de 3-pentilo	50	270	100	540	VLI	
203-686-1	109-60-4	Acetato de n-propilo	200	849	250	1.060		11-36- 66- 67
	20706-25-6	Acetato de 2-propoxietilo	20	120			vía dérmica	
203-545-4	108-05-4	Acetato de vinilo	10	36	15	54		11
200-816-9	74-86-2	Acetileno					b	5- 6- 12
202-708-7	98-86-2	Acetofenona	10	50				22-36
200-662-2	67-64-1	Acetona	500	1.210			VLB, VLI	11-36-66-67
200-835-2	75-05-8	Acetonitrilo	40	68			vía dérmica, VLI	11-20/21/22- 36
200-580-7	64-19-7	Ácido acético	10	25	15	37	véase Apartado 9	10- 35
200-064-1	50-78-2	Ácido acetilsalicílico (Aspirina)		5				
201-177-9	79-10-7	Ácido acrílico	2	6			vía dérmica	10-20/21/22- 35- 50

Actualización

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS VLA-ED		LÍMITES ADOPTADOS VLA-EC		NOTAS	FRASES R
			ppm	mg/m ³	ppm	mg/m ³		
204-673-3	124-04-9	Ácido adípico		5				36
		Acido arsénico y sus sales, como As					véase Apartado 7	45-23/25-50/53
209-952-3	598-78-7	Ácido 2-cloropropiónico	0,1	0,45			vía dérmica	22-35
200-923-0	75-99-0	Ácido 2,2-dicloropropiónico	1	5,9			véase Apartado 9	22- 38- 41- 52/53
200-579-1	64-18-6	Ácido fórmico	5	9			VLI	35
	7782-79-8	Ácido hidrazoico, vapor			0,1	0,18		
231-633-2	7664-38-2	Ácido ortofosfórico		1		2	VLI	34
201-204-4	79-41-4	Acido metacrílico	20	72				21/22-35
231-714-2	7697-37-2	Ácido nítrico			1	2,6	VLI	8- 35
205-634-3	144-62-7	Ácido oxálico		1			VLI	21/22
		Ácido pícrico			véase 2,4,6-Trinitrofenol			
201-176-3	79-09-4	Ácido propiónico	10	31	20	62	VLI	34
231-639-5	7664-93-9	Ácido sulfúrico		1		3	véase Apartado 9	35
202-830-0	100-21-0	Ácido tereftálico		10				
200-677-4	68-11-1	Ácido tioglicólico	1	3,8			vía dérmica	23/24/25- 34
200-927-2	76-03-9	Acido tricloroacético	1	6,8				35-50/53
201-173-7	79-06-1	Acilamida					véase Apartado 7	45-46-20/21-25-36/38- 43-48/23/24/25-62
205-480-7	141-32-2	Acrilato de n-butilo	2	11	10	53	VLI, Sen	10-36/37/38- 43
		Acrilato de etilo			véase Éster etílico del ácido 2-propenoico			
213-663-8	999-61-1	Acrilato de 2-hidroxipropilo	0,5	2,7			vía dérmica, Sen	23/24/25-34-43

⁹² Instituto Nacional de Seguridad e Higiene en el Trabajo (INSHT), 2008, Límites de exposición profesional para agentes químicos en España

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
202-500-6	96-33-3	Acrilato de metilo	2	7,2			vía dérmica, Sen	11-20/21/22-36/37/38-43
		Acrolonitrilo	véase Cianuro de vinilo					
203-453-4	107-02-8	Acroleína	0,1	0,23	0,3	0,69	véase Apartado 9	11-24/25-26-34-50
	77536-66-4	Actinolita	véase Amianto					45-48/23
203-896-3	111-69-3	Adiponitrilo	2	9			vía dérmica	
232-350-7	8006-64-2	Aguarrás	100	567	150	850	Sen, véase Apartado 9	10-20/21/22-36/38-43-51/53-65
200-945-0	76-22-2	Alcanfor sintético	2	13	3	19		
203-470-7	107-18-6	Alcohol alílico	2	5	5	12	vía dérmica, VLI	10-23/24/25-36/37/38-50
200-751-6	71-36-3	Alcohol n-butílico			50	154	vía dérmica, véase Apartado 9	10-22-37/38-41-67
201-158-5	78-92-2	Alcohol sec-butílico	100	308				10-36/37/67
200-889-7	75-65-0	Alcohol terc-butílico	100	308	150	462	véase Apartado 9	11-20
200-578-6	64-17-5	Alcohol etílico	1.000	1.910				11
202-626-1	98-00-0	Alcohol furfúrico	5	20	15	61	vía dérmica, véase Apartado 9	20/21/22
204-633-5	123-51-3	Alcohol isoamílico	100	366	125	458		
201-148-0	78-83-1	Alcohol isobutílico	50	154				10-37/38-41-67
248-133-5	26952-21-6	Alcohol isooctílico	50	271			vía dérmica	
200-661-7	67-63-0	Alcohol isopropílico	400	998	500	1.250	véase Apartado 9	11-36-67
		Alcohol metilamílico	véase 4-Metil-2-pentanol					
200-659-6	67-56-1	Alcohol metílico	200	266			vía dérmica, VLB, VLI	11-23/24/25-39/23/24/25
		Alcohol propargílico	véase Prop-2-ino-1-ol					

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
200-746-9	71-23-8	Alcohol n-propílico	200	500	400	1.000	vía dérmica	11-41-67
		Aldehído crotonico	véase 2-Butenal					
203-784-4	110-62-3	Aldehído n-valeriánico	50	179				
206-215-8	309-00-2	Aldrín		0,25			vía dérmica, ae, s	24/25-40-48/24/25-50/53
		Algodón en rama, polvo (fracción inhalable)		1,5			d	
232-679-6	9005-25-8	Almidón		10				
266-028-2	65996-93-2	Alquitrán de hulla, elevada temperatura. Brea					véase Apartado 7	45
231-072-3	7429-90-5	Aluminio:						
		Alquinos, como Al		2				
		Humos de soldadura, como Al		5				
		Metal en polvo		10				10-15
		Polvos de aluminoterapia, como Al		5				Al en polvo estabilizado
		Sales solubles, como Al		2			c	
	132207-33-1	Amianto					véase Apartado 7	45-48/23
205-483-3	141-43-5	2-Aminoetanol	1	2,5	3	7,5	vía dérmica, VLI	20/21/22-34
		Aminometano	véase Metilamina					
207-988-4	504-29-0	2-Aminopiridina	0,5	1,9				

Actualización

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
200-521-5	61-82-5	3-Amino-1,2,4-triazol		0,2			ae	48/22-63-51/53
		Amitrol	véase 3-Amino-1,2,4-triazol					
231-634-3	7664-41-7	Amoniaco	20	14	50	36	VLI	10-23-34-50
	12172-73-5	Amosita	véase Amianto					45-48/23
203-564-8	108-24-7	Anhídrido acético	5	21				10-20/22-34
201-607-5	85-44-9	Anhídrido ftálico	1	6			Sen	22-37/38-41-42/43
201-604-9	85-42-7	Anhídrido hexahidroftálico, todos los isómeros				0,005		41-42/43
203-571-6	108-31-6	Anhídrido maleico	0,25	1			Sen, véase Apartado 9	22-34-42/43
209-008-0	552-30-7	Anhídrido trimelítico		0,04		0,12	Sen	37-41-42/43
200-539-3	62-53-3	Anilina	2	7,7			vía dérmica, VLB	23/24/25-40-41-43-48/23/24/25-68-50
201-963-1	90-04-0	o-Anisidina					véase Apartado 7	45-23/24/25-68
203-254-2	104-94-9	p-Anisidina	0,1	0,5			vía dérmica, VLBm	26/27/28-33-50
231-146-5	7440-36-0	Antimonio		0,5				20/22-51-53
		Compuestos, como Sb, excepto hidruro de antimonio		0,5				con excepción del tetóxido, pentóxido, trisulfuro, pentasulfuro y los especialmente expresados en este documento
	77536-67-5	Antofilita	véase Amianto					45-48/23
		Antracita	véase Carbón					
201-706-3	86-88-4	ANTU		0,3				28-40
231-147-0	7440-37-1	Argón					b	
		Arsenamina	véase Hidruro de Arsénico					

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS		NOTAS	FRASES R	
			VLA-ED ppm	mg/m ³			VLA-EC ppm
231-148-6	7440-38-2	Arsénico elemental		0,01		VLB, r, s	23/25-50/53
		Compuestos de Arsénico, como As, excepto aquellos que están expresamente indicados en esta tabla		0,01		r, s	23/25-50/53
232-490-9	8052-42-4	Asfalto (petróleo) humos, aerosoles solubles en benceno		0,5			
217-617-8	1912-24-9	Atrazina		5		Sen, ae,s	43-48/22-50/53
247-852-1	26628-22-8	Azida de sodio		0,1	0,3	vía dérmica, VLI	28-32-50/53
		Aziduro de sodio				véase Azida de sodio	
231-149-1	7440-39-3	Bario y compuestos solubles como Ba		0,5		c, VLI	
200-753-7	71-43-2	Benceno				véase Apartado 7	45-46-11-36/38-48/23/24/25-65
241-775-7	17804-35-2	Benomilo				véase Apartado 7	46-60-61-37/38-43-50/53
203-405-2	106-51-4	p-Benzquinona	0,1	0,45			23/25-36/37/38-50
231-150-7	7440-41-7	Berilio				véase Apartado 7	49-25-26-36/37/38-43-48/23
		Compuestos de berilio, excepto los silicatos dobles de aluminio y berilio y excepto los indicados en esta tabla				véase Apartado 7	49-25-26-36/37/38-43-48/23-51/53
202-163-5	92-52-4	Bifenilo	0,2	1,3			36/37/38-50/53
231-548-0	7631-90-5	Bisulfito sódico		5			22-31
206-245-1	314-40-9	Bromacilo		10		s	
231-778-1	7726-95-6	Bromo	0,1	0,7		VLI	26-35-50
	74-97-5	Bromoclorometano	200	1.075			
209-800-6	593-60-2	Bromoetileno				véase Apartado 7	45-12
		Bromoformo				véase Tribromometano	
*203-445-0	106-94-5	1- Bromopropano	10				10-20

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
200-825-8	74-96-4	Bromuro de etilo	5	23			vía dérmica	11-20/22-40
233-113-0	10035-10-6	Bromuro de hidrógeno			2	7	VLI	35-37
200-813-2	74-83-9	Bromuro de metilo	1	4			vía dérmica, ae	23/25-36/37/38-68-48/20-50-59
		Bromuro de vinilo					véase Bromoetileno	
203-450-8	106-99-0	1,3-Butadieno					véase Apartado 7	45-46-12
203-448-7	106-97-8	Butano					véase Hidrocarburos alifáticos alcanos (C ₁ -C ₄) y sus mezclas, gases	12
		n-Butanol					véase Alcohol n-butílico	
		sec-Butanol					véase Alcohol sec-butílico	
		terc-Butanol					véase Alcohol terc-butílico	
		Butanona					véase Metileticetona	
		Butanotiol				véase n-Butilmercaptano		
204-647-1	123-73-9	2-Butenal			0,3	0,87	vía dérmica	11-24/25-26-37/38-41-48/22-50-68
		Butilamina (todos los isómeros)			5	15	vía dérmica	11-20/21/22-35
201-933-8	89-72-5	o-sec-Butilfenol	5	31			vía dérmica	
203-705-3	109-79-5	n-Butilmercaptano	0,5	1,9				
202-675-9	98-51-1	p-terc-Butiltolueno	1	6,2				
203-905-0	111-76-2	2-Butoxi-etanol	20	98	50	245	vía dérmica, VLI	20/21/22-36/38
203-961-6	112-34-5	2- (2-Butoxi-etoxi) etanol	10	67,5	15	101,2	VLI	36

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS		NOTAS	FRASES R
			VLA-ED ppm mg/m ³	VLA-EC ppm mg/m ³		
231-152-8	7440-43-9	Cadmio (estabilizado)			véase Apartado 7	45-26-48/23/25-62-63-68-50/53
		Compuestos de cadmio, como Cd, excepto el sulfoseleniuro (xCdS y CdSe), el sulfuro mixto de Cd y Zn (xCdS y ZnS), el sulfuro mixto de Cd y Hg (xCdS y HgS), y los especialmente indicados en este documento			VLB, r	20/21/22-50/53
		Fracción inhalable	0,01		d	
		Fracción respirable	0,002		d	
232-283-3	8001-35-2	Canfeno clorado	0,5	1	vía dérmica, ae, s	21-25-37/38-40-50/53
	1332-58-7	Caolín				
		Fracción respirable	2		d, e	
203-313-2	105-60-2	Caprolactama (vapor y polvo)	10	40	VLI	20/22-36/37/38
219-363-3	2425-06-1	Captafol			véase Apartado 7	45-43-50/53
205-087-0	133-06-2	Captán	5		Sen	23-40-41-43-50
200-555-0	63-25-2	Carbaril	5		vía dérmica	22-40-50
216-353-0	1563-66-2	Carbofurano	0,1		VLBa	26/28-50/53
		Carbón, polvo:				
		Antracita	2		véase Apartado 9	
		Bituminoso	2			
215-279-6	471-34-1	Carbonato de calcio	10		véase Apartado 9	
222-068-2	3333-67-3	Carbonato de níquel, como Ni	0,1		Sen, r	22-40-43-50/53
		Carborundo			véase Carburo de silicio	
206-991-8	409-21-2	Carburo de silicio	10		véase Apartado 9	
		Catecol			véase Pirocatecol	
232-674-9	9004-34-6	Celulosa	10			
266-043-4	65997-15-1	Cemento Portland	10			
232-315-6	8002-74-2	Cera de parafina, humos	2			

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R	
			VLA-ED		VLA-EC				
			ppm	mg/m ³	ppm	mg/m ³			
		Cereales, polvo (avena, trigo, cebada)		4			e		
207-336-9	463-51-4	Ceteno	0,5	0,87	1,5	2,6			
205-861-8	156-62-7	Cianamida cálcica		0,5			Sen	22-37-41	
206-992-3	420-04-2	Cianamida de hidrógeno	0,58	1			Sen, vía dérmica, VLI	21-25-36/38-43	
		Cianhidrina de la acetona	véase 2-Ciano-2-propanol						
205-275-2	137-05-3	2-Cianoacrilato de metilo	0,2	0,92				36/37/38	
207-306-5	460-19-5	Cianógeno	10	22				11-23-50/53	
200-909-4	75-86-5	2-Ciano-2-propanol, como CN			5		vía dérmica	26/27/28-50/53	
208-829-1	542-83-6	Cianuro de cadmio, como Cd Fracción inhalable Fracción respirable		0,01 0,002			VLB, r d d	26/27/28-32-33-68-50/53	
209-740-0	592-01-8	Cianuro de hidrógeno y sales de cianhídrico				5	vía dérmica	28-32-50/53	
200-821-6	74-90-8	Cianuro de calcio, como CN				4,7	5,3	vía dérmica	26/27/28-50/53
205-792-3	151-50-8	Cianuro de hidrógeno				5		vía dérmica	
205-599-4	143-33-9	Cianuro de potasio, como CN Cianuro de sodio, como CN				5		vía dérmica	
203-466-5	107-13-1	Cianuro de vinilo					véase Apartado 7	45-11-23/24/25-37/38-41-43-51/53	
203-806-2	110-82-7	Ciclohexano	200	700			VLI	11-38-50/53-65-67	
203-630-6	108-93-0	Ciclohexanol	50	208			vía dérmica	20/22-37/38	
203-631-1	108-94-1	Ciclohexanona	10	41	20	82	vía dérmica, VLI, VLB	10-20	

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
203-807-8	110-83-8	Ciclohexeno	300	1.020				
203-629-0	108-91-8	Ciclohexilamina	10	41				10-21/22-34
204-500-1	121-82-4	Ciclonita		0,5			vía dérmica	
208-835-4	542-92-7	Ciclopentadieno	75	206				
206-016-6	287-92-3	Ciclopentano	600	1.745				11-52/53
236-049-1	13121-70-5	Cihexaestaño		5				20/21/22-50/53
231-176-9	7440-67-7	Circonio y compuestos, como Zr		5		10		
221-008-2	2971-90-6	Clopidol		10				
200-349-0	57-74-9	Clordano		0,5			vía dérmica, ae, s	21/22-40-50/53
		Clorhidrina etilénica	véase 2-Cloroetanol					
231-959-5	7782-50-5	Cloro			0,5	1,5	VLI	23-36/37/38-50
203-472-8	107-20-0	Cloroacetaldehido			1	3,3		24/25-26-34-40-50
208-531-1	532-27-4	2-Cloroacetofenona	0,05	0,32				

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
201-161-1	78-95-5	Cloroacetona			1	3,8		
203-628-5	108-90-7	Clorobenceno	5	23	15	70	VLB, VLI	10-20-51/53
220-278-9	2696-41-1	o-Clorobencilideno malononitrilo			0,05	0,39	vía dérmica	
204-818-0	126-99-8	2-Cloro-1,3-butadieno					véase Apartado 7	45-11-20/22-36/37/38-48/20
	53469-21-9	Clorodifenilo (42% de cloro)	0,1	1,1			vía dérmica, ae,r, véase Apartado 9	
	11097-69-1	Clorodifenilo (54% de cloro)	0,05	0,7			vía dérmica, ae,r, véase Apartado 9	
200-891-8	75-68-3	1-Cloro- 1,1- difluoroetano	1.000	4.200				
200-871-9	75-45-6	Clorodifluorometano	1.000	3.600			VLI	
203-439-8	106-89-8	1-Cloro-2,3-epoxipropano					véase Apartado 7	45-10-23/24/25-34-43
218-026-8	2039-87-4	o-Cloroestireno	50	288	75	432		
		Cloroetano	véase Cloruro de etilo					
203-459-7	107-07-3	2-Cloroetanol			1	3,3	vía dérmica	26/27/28
		Cloroetileno	véase Cloruro de vinilo					
		Cloroformo	véase Triclorometano					
202-809-6	100-00-5	p-Cloronitrobenceno	0,1	0,65			vía dérmica, VLBm	23/24/25-40-48/20/21/22-68-51/53
209-990-0	600-25-9	1-Cloro-1-nitropropano	2	10				20/22
200-938-2	76-15-3	Cloropentafluoroetano	1.000	6.420				
		Cloropirrina	véase Tricloronitrometano					
		β-Cloropreno	véase 2-Cloro-1,3-butadieno					

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
202-424-3	95-49-8	o-Clorotolueno	50	264				20-51/53
200-894-4	75-72-9	Clorotrifluorometano	1.000	4.300				
220-864-4	2921-88-2	Clorpirifós		0,2			vía dérmica, VLBa, véase Apartado 9	25-50/53
203-457-6	107-05-1	Cloruro de alilo	1	3,2	2	6,4		11-20/21/22- 36/37/38-40- 48/20-68-50
235-186-4	12125-02-9	Cloruro amónico, humos		10		20		22-36
202-853-6	100-44-7	Cloruro de bencilo					véase Apartado 7	45-22-23-37/38- 41-48/22
202-710-8	98-88-4	Cloruro de benzoilo			0,5	2,9		34
200-870-3	75-44-5	Cloruro de carbonilo	0,02	0,08	0,1	0,4	VLI	26-34
233-296-7	10108-64-2	Cloruro de cadmio					véase Apartado 7	45-46-60-61-25- 26-48/23/25- 50/53
208-052-8	506-77-4	Cloruro de cianógeno			0,3	0,77		
231-592-0	7646-85-7	Cloruro de cinc, humos		1		2		22-34-50/53
201-171-6	79-04-9	Cloruro de cloroacetilo	0,05	0,23	0,15	0,7	vía dérmica	14-23/24/25-35- 48/23-50
239-056-8	14977-61-8	Cloruro de cromilo					véase Apartado 7	49-46-8-35-43- 50/53
200-830-5	75-00-3	Cloruro de etilo	100	268			VLI	12-40-52/53
231-596-7	7647-01-0	Cloruro de hidrógeno	5	7,6	10	15	VLI	23-35
200-838-9	75-09-2	Cloruro de metileno	50	177			VLB	40
200-817-4	74-87-3	Cloruro de metilo	50	105	100	210	vía dérmica	12-40-48/20

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R	
			VLA-ED		VLA-EC				
			ppm	mg/m ³	ppm	mg/m ³			
231-748-8	7719-09-7	Cloruro de tionilo			1	4,9		14-20/22-29- 35	
200-864-0	75-35-4	Cloruro de vinilideno	5	20			r	12-20-40	
200-831-0	75-01-4	Cloruro de vinilo					véase Apartado 7	45-12	
231-158-0	7440-48-4	Cobalto elemental y compuestos inorgánicos, como Co		0,02			VLB, Sen	42/43-53	
233-514-0	10210-68-1	Cobalto carbonilo, como Co		0,1					
	16842-03-8	Cobalto hidrocarbonilo, como Co		0,1					
231-159-6	7440-50-8	Cobre							
		Humos		0,2					
		Polvo y nieblas, como Cu		1					
		Colofonia	véase Resina núcleo de soldadura						
		Corindón	véase óxido de Aluminio						
215-293-2	1319-77-3	Cresoles	5	22			vía dérmica	24/25-34	
	12001-29-5	Crisotilo	véase Amianto						
		Cristobalita	véase Sílice Cristalina						
	12001-28-4	Crocidolita	véase Amianto						
237-366-8	13765-19-0	Cromato cálcico					véase Apartado 7	45-22-50/53	
		Cromatos de cinc, incluido el cromato de cinc y potasio, como Cr					véase Apartado 7	45-22-43- 50/53	
246-356-2	24613-89-6	Cromato de cromo (III)					véase Apartado 7	45-8-35-43- 50/53	
232-142-6	7789-06-2	Cromato de estroncio					véase Apartado 7	45-22-50/53	

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R	
			VLA-ED		VLA-EC				
			ppm	mg/m ³	ppm	mg/m ³			
231-846-0	7758-97-6	Cromato de plomo, como Cr como Pb		0,012 0,05			TR1 VLB	61-33-40- 50/53-62	
232-140-5	7789-00-6	Cromato de potasio					véase Apartado 7	49-46- 36/37/38-43- 50/53	
231-889-5	7775-11-3	Cromato de sodio					véase Apartado 7	45-46-60-61- 21-25-26-34- 42/43-48/23- 50/53	
	1189-85-1	Cromato de terc-butilo, como CrO ₃				0,1	vía dérmica		
	7440-47-3	Cromo metal, compuestos inorgánicos Cr(II) y Cr(III) insolubles, polvo total, como Cr		2			VLI		
	7440-47-3	Cromo (VI), compuestos inorgánicos, excepto el Cromato de bario y los específicamente citados en esta Tabla					véase Apartado 7	49-43-50/53	
		Crotonaldehido	véase 2-Butenal						
206-083-1	299-86-5	Cruformato	5				VLBa	21/22-50/53	
		Cuarzo	véase Sílice Cristalina						
202-704-5	98-82-8	Cumeno	20	100	50	250	vía dérmica, VLI	10-37-51/53- 65	
202-361-1	94-75-7	2,4-D		10			ae, Sen	22-37-41-43- 52/53	
		Dalapón	véase ácido 2,2-dicloropropiónico						
200-024-3	50-29-3	DDT		1			ae, s	25-40-48/25- 50/53	
241-711-8	17702-41-9	Decaborano	0,05	0,25	0,15	0,76	vía dérmica		

Actualización

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
	8065-48-3	Demeton	0,01	0,11			vía dérmica, VLBa, véase Apartado 9	27/28-50
204-626-7	123-42-2	Diacetona alcohol	50	241				36
203-468-6	107-15-3	1,2-Diaminoetano	10	25			vía dérmica, Sen	10-21/22-34-42/43
206-373-8	333-41-5	Diazinón		0,1			vía dérmica, VLBa, ae, véase Apartado 9	22-50/53
206-382-7	334-88-3	Diazometano					véase Apartado 7	45
242-940-6	19287-45-7	Diborano	0,1	0,11				
203-444-5	106-93-4	1,2-Dibromoetano					véase Apartado 7	45-23/24/25-36/37/38-51/53
		Dibromuro de etileno					véase 1,2-Dibromoetano	
203-057-1	102-81-8	2-N-Dibutilaminoetanol	0,5	3,6			vía dérmica, VLBa	
	7572-29-4	Dicloroacetileno			0,1	0,39		2-40-48/20
202-425-9	95-50-1	o-Diclorobenceno	20	122	50	306	vía dérmica, VLI	22-36/37/38-50/53
203-400-5	106-46-7	p-Diclorobenceno	20	122	50	306	VLI	36-40-50/53
212-121-8	764-41-0	1,4-Diclorobutadieno					véase Apartado 7	45-24/25-26-34-50/53

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
200-893-9	75-71-8	Diclorodifluorometano	1.000	4.115	1.250	5.145	véase Apartado 9	
204-258-7	118-52-5	1,3-Dicloro-5,5-dimetilhidantoína		0,2		0,4		
200-863-5	75-34-3	1,1-Dicloroetano	100	412			vía dérmica, r, VLI	11-22-36/37-52/53
203-458-1	107-06-2	1,2-Dicloroetano					véase Apartado 7	45-11-22-36/37/38
208-750-2	540-59-0	1,2-Dicloroetileno	200	807	250	1.010	véase Apartado 9	11-20-52/53
200-869-8	75-43-4	Diclorofluorometano	10	43				
		Diclorometano					véase Cloruro de metileno	
209-854-0	594-72-9	1,1-Dicloro-1-nitroetano	2	12				23/24/25
201-152-2	78-87-5	1,2-Dicloropropano	75	352	110	517	véase Apartado 9	11-20/22
208-826-5	542-75-6	1,3-Dicloropropeno	1	4,6			vía dérmica, Sen	10-20/21-25-36/37/38-43-50/53
200-937-7	76-14-2	Diclorotetrafluoroetano	1.000	7.110	1.250	8.890	véase Apartado 9	
233-036-2	10025-67-9	Dicloruro de diazofre			1	5,6		14-20-25-29-35-50
		Dicloruro de etileno					véase 1,2-Dicloroetano	

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
200-547-7	62-73-7	Diclorovós	0,1	0,91			vía dérmica, VLBa	24/25-26-43-50
232-143-1	7789-09-5	Dicromato de amonio					véase Apartado 7	45-46-60-61-2-8-21-25-26-34-42/43-48/23-50/53
231-906-6	7778-50-9	Dicromato de potasio					véase Apartado 7	45-46-60-61-8-21-25-26-34-42/43-48/23-50/53
234-190-3	10588-01-9	Dicromato de sodio					véase Apartado 7	45-46-60-61-8-21-25-26-34-42/43-50/53
	7789-12-0	Dicromato de sodio, dihidratado					véase Apartado 7	45-46-60-61-8-21-25-26-34-42/43-48/23-50/53
205-494-3	141-66-2	Dicrotofós		0,25			vía dérmica, VLBa, véase Apartado 9	24-28-50/53
220-433-0	2764-72-9	Dicut Fracción inhalable Fracción respirable		0,5 0,1			vía dérmica d d	50-53
200-484-5	60-57-1	Dieldrin		0,25			vía dérmica, ae, s	25-27-40-48/25-50/53
203-868-0	111-42-2	Dietanolamina	0,46	2			vía dérmica, f	22-38-41-48/22
203-716-3	109-89-7	Dietilamina	5	15	10	30	VLI, vía dérmica, f	11-20/21/22-35
202-845-2	100-37-8	2-Dietilaminoetanol	2	9,7			vía dérmica	10-20/21/22-34
		Dietilcetona					véase 3-Pentanona	
200-467-2	60-29-7	Dietiléter	100	308	200	616	VLI	12-19-22-66-67
		Dietilenglicol monobutiléter					véase 2-(2-butoxi)etanol	

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
203-865-4	111-40-0	Dietilentriamina	1	4,3			vía dérmica , Sen	21/22-34-43
204-539-4	122-39-4	Difenilamina		10				23/24/25-33-50/53
200-885-5	75-61-6	Difluorodibromometano	100	872				
231-996-7	7783-41-7	Difluoruro de oxígeno			0,05	0,11		
220-281-5	2699-79-8	Difluoruro de sulfurilo	5	21	10	42		23-48/20-50
224-729-0	4464-23-7	Diformiato de cadmio, como Cd Fracción inhalable Fracción respirable		0,01 0,002			VLB, r d d	23/25-33-68-50/53
205-551-2	142-64-3	Dihidrocloruro de piperacina		5				
235-008-5	12054-48-7	Dihidróxido de níquel, como Ni		0,1			Sen, r	20/22-40-43-50/53
203-620-1	108-83-8	Diisobutilcetona	25	148				10-37
		Diisocianato de 4,4'-d ciclohexilmetano	véase Metileno-bis-(4-ciclohexilisocianato)					
202-966-0	101-68-8	Diisocianato de 4,4'-difenilmetano	0,005	0,052			Sen	20-36/37/38-42/43
212-485-8	822-06-0	Diisocianato de 1,6-hexametileno	0,005	0,035			Sen	23-36/37/38-42/43
		Diisocianato de isoforona	véase 3-Isocianometil-3,5,5-trimetilciclohexilisocianato					
221-641-4	3173-72-6	Diisocianato de 1,5-naftileno	0,005	0,043			Sen	20-36/37/38-42-52/53
209-544-5 202-039-0	584-84-9 91-08-7	Diisocianato de 2,4-tolueno o Diisocianato de 2,6-tolueno	0,005	0,036	0,02	0,14	Sen	26-36/37/38-40-42/43-52/53

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
203-558-5	108-18-9	Diisopropilamina	5	21			vía dérmica	11-20/22-34
204-826-4	127-19-5	N,N-Dimetilacetamida	10	36	20	72	vía dérmica, VLB, TR2, VLI	61-20/21
204-697-4	124-40-3	Dimetilamina	2	3,8	5	9,4	VLI, f	12-20-37/38-41
215-091-4	1300-73-8	Dimetilaminobenceno, todos los isómeros	0,5	2,5			vía dérmica, VLBm	
204-493-5	121-69-7	N,N-Dimetilanilina	5	25	10	50	vía dérmica, VLBm	23/24/25-40-51/53
209-940-8	598-56-1	N,N-Dimetiletilamina	25	75	50	150		12-20/22-34
204-065-8	115-10-6	Dimetiléter	1.000	1.920			VLI	12
238-921-7	14857-34-2	Dimetiletóxisilano	0,5	2,2	1,5	6,5		
200-679-5	68-12-2	N,N-Dimetilformamida	10	30			vía dérmica , TR2, VLB	61-20/21-36
200-316-0	57-14-7	N,N-Dimetilhidracina					véase Apartado 7	45-11-23/25-34-51/53
		Dimetilpropano	véase Neopentano					
		Dimetoximetano	véase Metilal					
205-706-4	148-01-6	Dinitolmida		5				

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
211-063-0	628-96-6	Dinitrato de etilenglicol	0,05	0,3			vía dérmica	2-26/27/28-33
229-180-0	6423-43-4	Dinitrato de propilenglicol	0,05	0,34			vía dérmica, VLBm	
208-431-8	528-29-0	1,2-Dinitrobenceno	0,15	1			vía dérmica, VLBm	26/27/28-33-50-53
202-776-8	99-65-0	1,3-Dinitrobenceno	0,15	1			vía dérmica, VLBm	26/27/28-33-50/53
202-833-7	100-25-4	1,4-Dinitrobenceno	0,15	1			vía dérmica, VLBm	26/27/28-33-50/53
208-601-1	534-52-1	Dinitro-o-cresol		0,2			vía dérmica, Sen	26/27/28-38-68-41-43-44-50/53
204-450-0	121-14-2	2,4-Dinitrotolueno					véase Apartado 7	45-23/24/25-48/22-51/53-62-68
210-106-0	606-20-2	2,6-Dinitrotolueno					véase Apartado 7	45-23/24/25-48/22-52/53-62-68
246-836-1	25321-14-6	Dinitrotolueno técnico					véase Apartado 7	45-23/24/25-48/22-51/53-62-68
204-661-8	123-91-1	1,4- Dioxano	20	74			vía dérmica	11-19-36/37-40-66

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
201-107-7	78-34-2	Dioxatión		0,2			vía dérmica, VLBa, véase Apartado 9	24-26/28-50/53
231-195-2	7446-09-5	Dióxido de azufre	2	5,3	5	13		23-34
204-696-9	124-38-9	Dióxido de carbono	5.000	9.150			VLI	
233-162-8	10049-04-4	Dióxido de cloro	0,1	0,28	0,3	0,84		6-8-26-34-50
234-823-3	12035-36-8	Dióxido de níquel					véase Apartado 7	49-43-53
233-272-6	10102-44-0	Dióxido de nitrógeno	3	5,7	5	9,6		26-34
236-675-5	13463-67-7	Dióxido de titanio		10				
		Dióxido de vinilciclohexeno	véase 1-Epoxietil-3,4-epoxiciclohexano					
		Dipropilcetona	véase 4-Heptanona					
202-607-8	97-77-8	Disulfiram		2			f, Sen	22-43-48/22-50/53
206-054-3	298-04-4	Disulfotón		0,1			VLBa,s, véase Apartado 9	27/28-50/53
218-550-7	2179-59-1	Disulfuro de alilpropilo	0,5	3				
200-843-6	75-15-0	Disulfuro de carbono	10	31			vía dérmica, VLB, ae, véase Apartado 9	11-36/38-48/23-62-63
234-829-6	12035-72-2	Disulfuro de triniquel					véase Apartado 7	49-43-51/53
206-354-4	330-54-1	Diurón		10			ae	22-40-48/22-50/53
215-325-5	1321-74-0	Divinilbenceno	10	54				
	112-55-0	Dodecil mercaptano	0,1					
204-079-4	115-29-7	Endosulfán		0,1			vía dérmica, ae, s	24/25-36-50/53
200-775-7	72-20-8	Endrín		0,1			vía dérmica, ae, s	24-28-50/53
237-553-4	13838-16-9	Enflurano	75	575				
		Enzimas	véase Subtilisin					

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
		Epiclorhidrina	véase 1-Cloro-2,3-epoxipropano					
		EPN	véase Fenilfosfonato de O-etilo y O-(4-nitrofenilo)					
213-831-0	1024-57-3	Epóxido de heptacloro		0,05			vía dérmica	25-33-40-50/53
203-437-7	106-87-6	1-Epoxietil-3,4-epoxiciclohexano	0,1	0,58			vía dérmica	23/24/25-68
209-128-3	556-52-5	2,3-Epoxi-1-propanol					véase Apartado 7	45-60-21/22-23-36/37/38-68
	1302-74-5	Esmeril, polvo		10			e	
231-141-8	7440-31-5	Estaño Metal		2				
		Compuestos orgánicos, como Sn		0,1		0,2	vía dérmica	
		Óxido y compuestos inorgánicos, como Sn		2				
		Estearatos (no incluye los estearatos de metales tóxicos)		10				
		Esteatita (Jabón de sastrer)		6			d	
		Fracción inhalable		3			d	
205-438-8	140-88-5	Éster etílico del ácido 2-propenoico	5	21	15	62	Sen	11-20/21/22-36/37/38-43
		Estibamina	véase Hidruro de Antimonio					

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
202-851-5	100-42-5	Estireno (monómero)	20	86	40	172	VLB, ae	10-20-36/38
200-319-7	57-24-9	Estricnina		0,15				27/28-50/53
200-814-8	74-84-0	Etano	véase Hidrocarburos alifáticos alcanos (C ₁ -C ₄) y sus mezclas, gases					12
		Etanol	véase Alcohol etílico					
		Etanolamina	véase 2-Aminoetanol					
		Etanotol	véase Etilmercaptano					
203-442-4	106-92-3	Éter alilglicidílico (EAG)	1	4,7			Sen	10-20/22-37/38-40-41-43-52/53-62-68
219-376-4	2426-08-6	Éter n-butilglicidílico (EBG)	25	133			Sen, véase Apartado 9	10-20/22-37-40-43-52/53-68
208-832-8	542-88-1	Éter bis(clorometílico)					véase Apartado 7	45-10-22-24-26
203-870-1	111-44-4	Éter dicloroetilico	5	30	10	60	vía dérmica	10-26/27/28-40
		Éter dietílico	véase Dietiléter					
218-802-6	2238-07-5	Éter diglicidílico (EDG)	0,1	0,54				
203-560-6	108-20-3	Éter diisopropílico	250	1.060	310	1.310		11-19-66-67
		Éter dimetilico	véase Dimetiléter					
211-309-7	637-92-3	Éter etil terc-butílico (ETBE)	5	21				
204-557-2	122-60-1	Éter fenilglicidílico (EFG)					véase Apartado 7	45-20-37/38-43-52/53-68

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS		NOTAS	FRASES R	
			VLA-ED ppm	VLA-ED mg/m ³			VLA-EC ppm
202-981-2	101-84-8	Éter fenílico, vapor	1	7,1	2	14,2	
223-672-9	4016-14-2	Éter isopropilglicidílico (EIG)	50	241	75	362	
216-653-1	1634-04-4	Éter metil-terc-butílico	40	147			véase Apartado 9
252-104-2	34590-94-8	Éter metílico de dipropilenglicol	50	308			vía dérmica, VLI
		Éter 1-metílico de propilenglicol			véase 1-Metoxipropan-2-ol		
		Éter 2-metílico de propilenglicol			véase 2-Metoxipropanol		
		Éter monobutílico del etilenglicol			véase 2-Butoxietanol		
		Éter monoetilico del etilenglicol			véase 2-Etoxietanol		
		Éter monometílico del etilenglicol			véase 2-Metoxietanol		
		Éter monopropílico del etilenglicol			véase 2-Propoxietanol		
		Etilamlicetona			véase 5-Metilheptan-3-ona		
200-834-7	75-04-7	Etilamina	5	9			VLI
202-849-4	100-41-4	Etilbenceno	100	441	200	884	vía dérmica, VLB, VLI
203-388-1	106-35-4	Etilbutilcetona	20	95			VLI
		Etilendiamina			véase 1,2-Diaminoetano		
203-473-3	107-21-1	Etilenglicol	20	52	40	104	vía dérmica, VLI
205-793-9	151-56-4	Etilenimina					véase Apartado 7
200-815-3	74-85-1	Etileno	200				12-67

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS		NOTAS	FRASES R	
			VLA-ED ppm	VLA-ED mg/m ³			VLA-EC ppm
	16219-75-3	Etilidennorborno			5	25	
200-837-3	75-08-1	Etilmercaptano	0,5	1,3			11-20-50/53
202-885-0	100-74-3	N-Etilmorfolina	5	24			vía dérmica
209-242-3	563-12-2	Etión		0,4			vía dérmica, VLBa, véase Apartado 9, s
203-804-1	110-80-5	2-Etoxietanol	5	18			vía dérmica, VLB, TR2, VLB
244-848-1	22224-92-6	Fenamifós		0,1			vía dérmica, VLBa, véase Apartado 9
202-430-6	95-54-5	o-Fenilendiamina		0,1			Sen
203-584-7	108-45-2	m-Fenilendiamina		0,1			Sen
203-404-7	106-50-3	p-Fenilendiamina		0,1			Sen
211-325-4	638-21-1	Fenilfosfina			0,05	0,23	
202-873-5	100-63-0	Fenilhidracina					véase Apartado 7
203-635-3	108-98-5	Fenilmercaptano	0,1	0,46			vía dérmica
		2-Fenilpropeno			véase α -Metilestireno		

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS		NOTAS	FRASES R	
			VLA-ED ppm	VLA-ED mg/m ³			VLA-EC ppm
218-276-8	2104-64-5	Feniltiofosfonato de o-etilo y o-(4-nitrofenilo)		0,1			vía dérmica, VLBa
203-632-7	108-95-2	Fenol	2	8			vía dérmica, VLB, VLI
202-196-5	92-84-2	Fenotiazina		5			vía dérmica
204-114-3	115-90-2	Fensulfotión		0,1			VLBa, véase Apartado 9
200-231-9	55-38-9	Fentión		0,2			vía dérmica, VLBa, s, véase Apartado 9
238-484-2	14484-64-1	Ferbam		10			s
	12604-58-9	Ferrovandio, polvo		1		3	
		Fibras manufacturadas:					
		Fibras vítreas artificiales (fibras cerámicas refractarias, fibras para usos especiales, etc.)					véase Apartado 7
		Fibras vítreas artificiales (fibra de vidrio, lana mineral, etc.)	1	fibras/cm ³			g, h
		Filamento continuo y fibras vítreas artificiales excluidas de clasificación como carcinógenas			Trátense como partículas no clasificadas de otra forma		i
		Otras fibras artificiales o sintéticas (p-Aramida, etc.)	1	fibras/cm ³			h

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
231-954-8	7782-41-4	Flúor	1	1,6	2	3,2	VLI, VLB	7-26-35
200-548-2	62-74-8	Fluoroacetato de sodio		0,05			vía dérmica	26/27/28-50
232-220-0	7790-79-6	Fluoruro de Cadmio					véase Apartado 7	45-46-60-61-25-26-48/23/25-50/53
206-534-2	353-50-4	Fluoruro de carbonilo	2	5,5	5	14		
231-634-8	7664-39-3	Fluoruro de hidrógeno	1,8	1,5	3	2,5	VLB, VLI	26/27/28-35
231-526-0	7616-94-6	Fluoruro de perclorilo	3	13	6	26		
		Fluoruros inorgánicos, como F, excepto el hexafluoruro de uranio		2,5			VLB, VLI	
213-408-0	944-22-9	Fonofós		0,1			vía dérmica, s, VLBA, véase Apartado 9	27/28-50/53
206-052-2	298-02-2	Forato		0,05		0,2	vía dérmica, s, VLBA, véase Apartado 9	27/28-52/53
200-001-8	50-00-0	Formaldehido			0,3	0,37	Sen, y	23/24/25-34-40-43
200-842-0	75-12-7	Formamida	10	19			vía dérmica, TR2	61
203-721-0	109-94-4	Formiato de etilo	100	308				11-20/22-36/37
203-481-7	107-31-3	Formiato de metilo	100	270	150	406	vía dérmica	12-20/22-36/37
		Fosfamina					véase Hidruro de Fósforo	
219-772-7	2528-36-1	Fosfato de dibutilfenilo	0,3	3,6			vía dérmica, VLB	
203-509-8	107-66-4	Fosfato de dibutilo	1	8,7	2	17		
204-800-2	126-73-8	Fosfato de tributilo	0,2	2,2			VLBA	22-38-40

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
204-112-2	115-86-6	Fosfato de trifenilo		3				
201-103-5	78-30-8	Fosfato de triortocresilo		0,1			vía dérmica, VLBA	39/23/24/25-51/53
204-471-5	121-45-9	Fosfito de trimetilo	2	10				
231-768-7	12185-10-3	Fósforo (P ₄)	0,02	0,1				
		Fosgeno					véase Cloruro de carbonilo	
201-557-4	84-74-2	Ftalato de dibutilo		5			TR2, ae,r	61-50-62
204-211-0	117-81-7	Ftalato de di-2-etilhexilo		5			TR2, ae,r	60-61
201-550-6	84-66-2	Ftalato de dietilo		5				
205-011-6	131-11-3	Ftalato de dimetilo		5				
210-933-7	626-17-5	m-Ftalodinitrilo		5				
202-627-7	98-01-1	2-Furaldehido	2	8			vía dérmica, VLB	21-23/25-36/37-40
		Furfural					véase 2-Furaldehido	
289-220-8	86290-81-5	Gasolina					véase Apartado 7	45-65
		Gel de sílice					véase Sílice Amorfa	
200-289-5	56-81-5	Glicerina, nieblas		10				
		Glicícol					véase 2,3-Epoxi-1-propanol	
203-856-5	111-30-8	Glutaraldehido			0,05	0,2	Sen	23/25-34-42/43-50
231-955-3	7782-42-5	Grafito, polvo		2				
231-166-4	7440-58-6	Hafnio y compuestos, como Hf		0,5				
205-796-5	151-67-7	Halotano	50	410				

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
		Harina, fracción inhalable		4			d, Sen	
		HDI					véase Diisocianato de 1,6-hexametileno	
231-168-5	7440-59-7	Helio					b	
200-962-3	76-44-8	Heptacloro		0,05			vía dérmica, ae, s	24/25-33-40-50/53
205-563-8	142-82-5	n-Heptano	500	2.085			VLI	11-38-50/53-65-67
		2-Heptanona					véase Metil-n-amilcetona	
		3-Heptanona					véase Etilbutilcetona	
204-608-9	123-19-3	4-Heptanona	50	239				10-20
204-273-9	118-74-1	Hexaclorobenceno					véase Apartado 7	45-48/25-50/53
201-765-5	87-68-3	Hexaclorobutadieno	0,02	0,2			vía dérmica	
201-029-3	77-47-4	Hexaclorociclopentadieno	0,01	0,11				22-24-26-34-50/53
200-666-4	67-72-1	Hexacloroetano	1	9,8			vía dérmica, r	
215-641-3	1335-87-1	Hexacloronaftaleno		0,2			vía dérmica	
211-676-3	684-16-2	Hexafluoroacetona	0,1	0,69			vía dérmica	
241-084-0	17010-21-8	Hexafluorosilicato (2-) de cadmio, como Cd					VLB,r	
		Fracción inhalable		0,01			d	
		Fracción respirable		0,002			d	23/25-33-68-50/53
219-854-2	2551-62-4	Hexafluoruro de azufre	1.000	6.075				
	7783-79-1	Hexafluoruro de selenio, como Se	0,05	0,16				
232-027-0	7783-80-4	Hexafluoruro de telurio	0,02	0,2				
		Hexametildiamina					véase 1,6-Hexanodiamina	

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
203-777-6	110-54-3	Hexano :						
		n-Hexano	20	72			VLB,VLI	11-38-48/20-51/53-62-65-67
		Otros isómeros	500	1.790	1.000	3.580		
204-679-6	124-09-4	1,6-Hexanodiamina	0,5	2,4				21/22-34-37
203-489-0	107-41-5	2-Hexanona			véase Metil-n-butilcetona			
		Hexilenglicol			25	123		36/38
206-114-9	302-01-2	Hexona			véase Metilisobutilcetona			
		Hidracina					véase Apartado 7	45-10-23/24/25-34-43-50/53
		Hydrocarburos alifáticos alcanos (C ₁ - C ₄) y sus mezclas, gases	1000					12
215-605-7	1333-74-0	Hidrógeno					b	50/53
232-064-2	7784-40-9	Hidrogenoarsenato de plomo					véase Apartado 7	45-61-23/25-33-50/53-62
204-617-8	123-31-9	Hidroquinona		2			Sen	22-68-40-41-43-50
215-137-3	1305-62-0	Hidróxido de calcio		5				
244-344-1	21351-79-1	Hidróxido de cesio		2				
215-181-3	1310-58-3	Hidróxido de potasio				2		22-35
215-185-5	1310-73-2	Hidróxido de sodio				2		35
	7803-52-3	Hidruro de antimonio	0,1	0,5				
232-066-3	7784-42-1	Hidruro de arsénico	0,05	0,16			r	12-26-48/20-50/53

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
232-260-8	7803-51-2	Hidruro de fósforo	0,1	0,14	0,2	0,28	VLI	12-17-26-34-50
231-484-3	7580-67-8	Hidruro de litio		0,025				
203-039-3 236-670-8	102-54-5 13463-40-6	Hierro :						
		Diciclopentadienilo		10				
		Pentacarbonilo, como Fe Sales solubles, como Fe	0,1	0,8	0,2	1,6		c
202-393-6	95-13-6	Indeno	10	48				
231-180-0	7440-74-6	Indio y compuestos, como In		0,1				
		Isobutanol			véase Alcohol isobutilico			
203-137-6	103-71-9	Isocianato de fenilo	0,01	0,05				
210-866-3	624-83-9	Isocianato de metilo	0,02	0,047			vía dérmica	12-24/25-26-37/38-41-42/43-63
223-861-6	4098-71-9	3-Isocianometil-3,5,5-trimetilciclohexilisocianato	0,005	0,046			Sen	23-36/37/38-42/43-51/53
247-897-7	26675-46-7	Isoflurano	50	383				
201-126-0	78-59-1	Isoforona			5	29		21/22-36/37-40
201-142-8	78-78-4	Isopentano	1.000	3.000			VLI	12-51/53-65-66-67
		Isopropanol			véase Alcohol isopropilico			

Actualización

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
200-860-9	75-31-0	Isopropilamina	5	12	10	24		12-36/37/38
212-196-7	768-52-5	N-Isopropilamina	2	11			vía dérmica, VLBm	
203-685-6	109-59-1	2-Isopropoxietanol	5	22			vía dérmica	20/21-36
231-174-8	7440-65-5	Itrio, metal y compuestos, como Y		1				
205-316-4	138-22-7	Lactato de n-butilo	5	30				
	9006-04-6	Látex natural como proteínas totales		0,001			Sen, vía dérmica	
200-401-2	58-89-9	Lindano		0,5			vía dérmica, ae, s	20/21-25-48/22-64-50/53
		Maderas duras, polvo					véase Apartado 7, md	
208-915-9	546-93-0	Maderas blandas, polvo	5	10			md	
		Magnesita					e, véase Apartado 9	
204-497-7	121-75-5	Malatión		10			vía dérmica, ae, VLBa, véase Apartado 9	22-50/53
231-105-1	7439-96-5	Manganeso		0,2				
235-142-4	12079-65-1	Elemental y compuestos inorgánicos como Mn		0,1			vía dérmica	
235-166-5	12108-13-3	Ciclopentadieniltricarbonilo, como Mn		0,2			vía dérmica	
		Mármol			véase Carbonato de calcio			
		MDI			véase Diisocianato de 4,4'-difenilmetano			
231-106-7	7439-97-6	Mercurio elemental y compuestos inorgánicos, como Hg	0,025				vía dérmica, VLB, s	23-33-50/53

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
		Mercurio : Alquil-compuestos, como Hg Ariil-compuestos, como Hg		0,01 0,1		0,03	vía dérmica vía dérmica	
		Mesitileno	véase 1,3,5-Trimetilbenceno					
231-673-0	7681-57-4	Metabisulfito sódico	5					22-31-41
201-297-1	80-62-6	Metacrilato de metilo	50	208	100	416	Sen	11-37/38-43
200-812-7	74-82-8	Metano	véase Hidrocarburos alifáticos alcanos (C ₁ - C ₄) y sus mezclas, gases					12
		Metanol	véase Alcohol metílico					
		Metanotiol	véase Metilmercaptano					
200-828-4	74-99-7	Metilacetileno	1.000	1.665				
		Metilacilonitrilo	véase 2-Metil-2-propeno-nitrilo					
203-714-2	109-87-5	Metilal	1.000 3.165					
203-767-1	110-43-0	Metil-n-amilcetona	50	237	100	474	vía dérmica, VLI	10-20/22
200-820-0	74-89-5	Metilamina	5	6,5	15	19		12-20-37/38-41
202-870-9	100-61-8	N-Metilaniilina	0,5	2,2			vía dérmica, VLBm	23/24/25-33-50/53
201-676-1	86-50-0	Metil azinfós		0,2			vía dérmica, VLBa, Sen	24-26/28-43-50/53
		Metilbutano	véase Isopentano					
209-731-1	591-78-6	Metil-n-butilcetona	5	21			vía dérmica, VLB, véase Apartado 9	10-48/23-62-67
203-624-3	108-87-2	Metilciclohexano	400	1.630				11-38-51/53-65-67

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
247-152-6	25639-42-3	Metilciclohexanol, todos los isómeros	50	237				
209-513-6	583-60-8	2-Metilciclohexanona	50	233	75	349	vía dérmica	10-20
		Metilcloroformo	véase 1,1,1-Tricloroetano					
	8022-00-2	Metil demetón	0,5				vía dérmica, VLBa	
202-974-4	101-77-9	4,4'-Metilendianilina					véase Apartado 7	45-39/23/24/25-43-48/20/21/22-51/53-68
225-863-2	5124-30-1	Metileno-bis(4-ciclohexilisocianato)	0,005	0,055			Sen	23-36/37/38-42/43
202-918-9	101-14-4	4,4'-Metileno-bis (2-cloroanilina) (MBOCA)					véase Apartado 7	45-22-50/53
202-705-0	98-83-9	α-Metilestireno	50	246	100	492	VLI	10-36/37-51/53
201-159-0	78-93-3	Metiletilcetona	200	600	300	900	VLB, VLI	11-36-66-67
208-793-7	541-85-5	5-Metilheptan-3-ona	10	53	20	107	VLI	10-36/37
203-737-8	110-12-3	5-Metilhexan-2-ona	20	95			VLI	10-20
200-471-4	60-34-4	Metilhidracina	0,01	0,019			vía dérmica	
		Metilisoamilcetona	véase 5-Metilhexan-2-ona					
		Metilisobutilcetona	véase 4-Metilpentan-2-ona					
209-264-3	563-80-4	Metilisopropilcetona	200	715				11
200-822-1	74-93-1	Metilmercaptano	0,5	1				12-23-50/53
206-050-1	298-00-0	Metil paratión		0,2			vía dérmica, VLBa, ae, s	5-10-24-26/28-48/22-50/53

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
203-551-7	108-11-2	4-Metil-2-pentanol	25	106	40	170	vía dérmica	10-37
203-550-1	108-10-1	4-Metilpentan-2-ona	20	83	50	208	VLB, VLI	11-20-36/37-66
212-828-1	872-50-4	1-Metil-2-pirrolidona	25	103	75	309	vía dérmica	36/38
204-817-5	126-98-7	2-Metil-2-propeno-nitrilo	1	2,7			vía dérmica, Sen	11-23/24/25-43
203-528-1	107-87-9	Metilpropilcetona	200	715	250	894		
277-780-6	74222-97-2	Metilsulfometuron	5					
240-815-0	16752-77-5	Metomilo	2,5				VLBa	28-50/53
200-779-9	72-43-5	Metoxicloro	10				s	
203-713-7	109-86-4	2-Metoxietanol	5	16			vía dérmica, TR2, véase Apartado 9	60-61-10-20/21/22
203-906-6	111-77-3	2-(2-Metoxietoxi)etanol	10	50,1			vía dérmica, VLI	63
205-769-8	150-76-5	4-Metoxifenol	5				Sen	22-36-43
203-539-1	107-98-2	1-Metoxipropan-2-ol	100	375	150	568	vía dérmica, VLI	10
216-455-5	1589-47-5	2-Metoxipropanol	5	19			TR2	61-10-37/38-41
244-209-7	21087-64-9	Metribuzin	5					22-50/53
232-095-1	7786-34-7	Mevinfós	0,01	0,09	0,03	0,27	vía dérmica, VLBa, s, véase Apartado 9	27/28-50/53
	12001-26-2	Mica	3				d, e	
231-107-2	7439-98-7	Molibdeno, como Mo	10				véase Apartado 9	
		Compuestos insolubles	5				c	
		Compuestos solubles	5				c	
		Monocloruro de azufre	véase Dicloruro de diazofre					

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
230-042-7	6923-22-4	Monocrotófos		0,25			vía dérmica, VLBa,s, véase Apartado 9	24-26/28-68-50/53
211-128-3	630-08-0	Monóxido de carbono	25	29			TR1 , VLB	61-12-23-48/23
215-215-7	1313-99-1	Monóxido de níquel					véase Apartado 7	49-43-53
233-271-0	10102-43-9	Monóxido de nitrógeno	25	31			VLBm, véase Apartado 9	
203-815-1	110-91-8	Morfolina	10	36	20	72	VLI	10-20/21/22-34
202-049-5	91-20-3	Naftaleno	10	53	15	80	vía dérmica	22-40-50/53
206-098-3	300-76-5	Naled		3			vía dérmica, VLBa, véase Apartado 9	21/22-36/38-50
215-609-9	1333-86-4	Negro de humo		3,5				
231-110-9	7440-01-9	Neón					b	
207-343-7	463-82-1	Neopentano	1.000	3.000			VLI	12-51/53-65-66-67
200-193-3	54-11-5	Nicotina		0,5			VLI, vía dérmica	25-27-51/53
		Níquel, compuestos inorgánicos excepto aquellos que están expresamente indicados en esta tabla						
		Compuestos insolubles, como Ni		0,2			c, Sen, r	
		Compuestos solubles, como Ni		0,1			c, Sen, r	
231-111-4	7440-02-0	Níquel metal		1			Sen, r	40-43
236-669-2	13463-39-3	Níquel carbonilo, como Ni	0,05	0,12			TR2, r	61-11-26-40-50/53
217-682-2	1929-82-4	Nitrapirina		10		20		22-51/53
210-985-0	627-13-4	Nitrato de n-propilo	25	109	40	175	VLBm	
202-810-1	100-01-6	p-Nitroanilina		3			vía dérmica, VLBm	23/24/25-33-52/53

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
202-716-0	98-95-3	Nitrobenceno		0,2		1	vía dérmica, VLB, VLI	23/24/25-40-48/23/24-51/53-62
201-188-9	79-24-3	Nitroetano	100	312				10-20/22
231-783-9	7727-37-9	Nitrógeno					b	
200-240-8	55-63-0	Nitroglicerina	0,05	0,5			vía dérmica	3-26/27/28-33-51/53
200-876-6	75-52-5	Nitrometano	20	51				5-10-22
203-544-9	108-03-2	1-Nitropropano	25	93				10-20/21/22
201-209-1	79-46-9	2-Nitropropano					véase Apartado 7	45-10-20/22
201-853-3	88-72-2	2-Nitrotolueno					véase Apartado 7	45-46-22-62-51/53
202-728-6	99-08-1	3-Nitrotolueno	5	29			vía dérmica, VLBm, véase Apartado 9	
202-808-0	99-99-0	4-Nitrotolueno	5	29			vía dérmica, VLBm, ae, véase Apartado 9	23/24/25-33-51/53
203-913-4	111-84-2	Nonano, todos los isómeros	200	1.065				
218-778-7	2234-13-1	Octacloronaftaleno		0,1		0,3	vía dérmica	
203-892-1	111-65-9	Octano, todos los isómeros	300	1.420				11-38-50/53-65-67

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
233-046-7	10025-87-3	Oxícloruro de fósforo	0,1	0,64				14-22-26-35-48/23
215-691-6	1344-28-1	Oxido de aluminio		10				
215-133-1	1304-56-9	Óxido de berilio					véase Apartado 7	49-25-26-36/37/38-43-48/23
215-125-8	1303-86-2	Oxido de boro		10				
215-146-2	1306-19-0	Óxido de cadmio					véase Apartado 7	45-26-48/23/25-62-63-68-50/53
215-138-9	1305-78-8	Óxido de calcio		2				
215-222-5	1314-13-2	Oxido de cinc Humos Polvo		5 10		10	véase Apartado 9	50/53 10-15 para el Polvo estabilizado
	31242-93-0	Oxido de difenilo o-clorado		0,5				
233-032-0	10024-97-2	Óxido de dinitrógeno	50	92				
200-849-9	75-21-8	Óxido de etileno					véase Apartado 7	45-46-12-23-36/37/38
215-168-2	1309-37-1	Óxido de hierro(III) (polvo y humos), como Fe		5				
215-171-9	1309-48-4	Óxido de Magnesio (humos y polvo)		10				
205-502-5	141-79-7	Óxido de mesitilo	15	61	25	102		10-20/21/22
200-879-2	75-56-9	Óxido de propileno					véase Apartado 7	45-46-12-20/21/22-36/37/38
215-238-2	1314-61-0	Óxido de tántalo, polvo, como Ta		5				
233-069-2	10028-15-6	Ozono : Trabajo pesado Trabajo moderado Trabajo ligero Trabajo pesado, moderado o ligero (≤ 2 horas)	0,05 0,08 0,1 0,2	0,1 0,16 0,2 0,4				

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
225-141-7	4685-14-7	Paracuat : Fracción inhalable Fracción respirable		0,5 0,1			d d	24/25-36/37/38
217-615-7	1910-42-5	Paracuat dicloruro		0,1			via dérmica	24/25-26-36/37/38-48/25-50/53
200-271-7	56-38-2	Paratión		0,1			via dérmica, VLB, ae, s, véase Apartado 9	24-26/28-48/25-50/53
		Partículas (insolubles o poco solubles) no especificadas de otra forma: Fracción inhalable Fracción respirable		10 3			c, o d, e d, e	
		Pelitre					véase Piretrinas	
243-194-4	19624-22-7	Pentaborano	0,005	0,013	0,015	0,039		
201-778-6	87-86-5	Pentaclorofenol		0,5			via dérmica, VLB, r	24/25-26-36/37/38-40-50/53
215-320-8	1321-64-8	Pentacloronaftaleno		0,5			via dérmica	21/22-36/38-50/53
201-435-0	82-68-8	Pentacloronitrobenzeno		0,5			Sen	43-50/53
233-060-3	10026-13-8	Pentacloruro de fósforo		1			VLI	14-22-26-34-48/20

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
204-104-9	115-77-5	Pentaeritritol Fracción inhalable Fracción respirable		10 4			d d	
227-204-4	5714-22-7	Pentafluoruro de azufre			0,01	0,1		
232-157-8	7789-30-2	Pentafluoruro de bromo	0,1	0,73				
203-692-4	109-66-0	Pentano	1.000	3.000			VLI	12-51/53-65-66-67
		2-Pentanona						véase Metilpropilcetona
202-490-3	96-22-0	3-Pentanona	200	716	300	1.075		11-37-66-67
215-242-4	1314-80-3	Pentasulfuro de fósforo		1			VLI	11-20/22-29-50
215-116-9	1303-28-2	Pentóxido de diarsénico					véase Apartado 7	45-23/25-50/53
215-236-1	1314-56-3	Pentóxido de fósforo		1			VLI	35
215-239-8	1314-62-1	Pentóxido de vanadio, como V ₂ O ₅ , polvo respirable o humos		0,05			d, VLB	20/22-37-68-48/23-51/53-63
204-825-9	127-18-4	Percloroetileno	25	172	100	689	VLB, ae	40-51/53
209-840-4	594-42-3	Perclorometilmercaptano	0,1	0,77				
	19430-93-4	Perfluorobutiletieno	100					
	382-21-8	Perfluorisobutieno			0,01	0,083		
223-320-4	3825-26-1	Perfluorooctanoato amónico		0,01			via dérmica	
	93763-70-3	Perlita		10			e, véase Apartado 9	
202-327-6	94-36-0	Peróxido de benzoilo		5			Sen	2-36-43

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
		Peróxido de 2-butanona	véase		Peróxido de metiletilcetona			
231-765-0	7722-84-1	Peróxido de hidrógeno	1	1,4				5-8-20/22-35
215-661-2	1338-23-4	Peróxido de metiletilcetona			0,2	1,5		
231-786-5	7727-54-0	Persulfato de:						
231-781-8	7727-21-1	Amonio		0,1			Sen	8-22-36/37/38-42/43
231-892-1	7775-27-1	Potasio		0,1				
217-636-1	1918-02-1	Sodio		0,1				
201-462-8	83-26-1	Picloram		10				
203-808-3	110-85-0	Pindona		0,1				25-48/25-50/53
232-319-8	8003-34-7	Piperacina		0,1	0,3		VLI, Sen	34-42/43-52/53
203-809-9	110-86-1	Piretrinas		1			VLI	20/21/22-50/53 incluyendo las cinerinas
204-427-5	120-80-9	Piridina	1	3			VLip	11-20/21/22
231-767-1	7722-88-5	Pirocatecol	5	23			vía dérmica	21/22-36/38
231-131-3	7440-22-4	Pirofosfato tetrasódico		5			véase Apartado 9	
231-116-1	7440-06-4	Plata: Metal Compuestos solubles como Ag		0,1 0,01			VLI c, VLI	

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
231-100-4	7439-92-1	Plomo inorgánico y sus derivados, como Pb		0,15			k, VLB, TR1	61-20/22-33-50-53-62
201-075-4	78-00-2	Plomo tetraetilo, como Pb		0,1			vía dérmica, TR1	61-26/27/28-33-50-53-62
200-897-0	75-74-1	Plomo tetrametilo, como Pb		0,15			vía dérmica, TR1	61-26/27/28-33-50-53-62
		Politetrafluoretileno, productos de su descomposición					l	
200-827-9	74-98-6	Propano	Véase Hidrocarburos alifáticos alcanos (C ₁ - C ₄) y sus mezclas, gases					12
200-878-7	75-55-8	Propilenimina					véase Apartado 7	45-11-26/27/28-41-51/53
204-062-1	115-07-1	Propileno	500					12
220-548-6	2807-30-9	2-Propoxietanol	20	86			vía dérmica	21-36
		Propino	véase Metilacetileno					
203-471-2	107-19-7	Prop-2-ino-1-ol	1	2,3			vía dérmica	10-23/24/25-34-51/53
200-340-1	57-57-8	β-Propiolactona					véase Apartado 7	45-26-36/38
204-043-8	114-26-1	Propoxur		0,5			VLBa,sr	25-50/53
		Protóxido de nitrógeno	véase Óxido de dinitrógeno					
		Quinona	véase p-Benzoquinona					

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
232-475-7	8050-09-7	Resina núcleo de soldadura (colofonia)					m, Sen	43
203-585-2	108-46-3	Resorcinol	10	46			VLI,ae	22-36/38-50
231-125-0	7440-16-6	Rodio						
		Metal y compuestos insolubles, como Rh		1			c	
		Compuestos solubles, como Rh		0,01			c	
206-082-6	299-84-3	Ronnel		10			VLBa, véase Apartado 9	21/22-50/53
201-501-9	83-79-4	Rotenona comercial		5				25-36/37/38-50/53
200-334-9	57-50-1	Sacarosa		10				
231-957-4	7782-49-2	Selenio, compuestos de, como Se (excepto el Seleniuro de hidrógeno)		0,1			véase Apartado 9	23/25-33-53
231-978-9	7783-07-5	Seleniuro de hidrógeno	0,02	0,07	0,05	0,17	VLI	
205-259-5	136-78-7	Sesona		10				
215-710-8	1344-95-2	Silicato cálcico (sintético)		10			e	
201-083-8	78-10-4	Silicato de etilo	10	87	30	260	véase Apartado 9	10-20-36/37
211-656-4	681-84-5	Silicato de metilo	1	6,3				
		Sílice Amorfa :						
	112926-00-8	Gel de sílice		10			véase Apartado 9	
262-373-8	60676-86-0	Sílice fundida					véase Apartado 9	
		Fracción respirable		0,1			d	

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS		NOTAS	FRASES R
			VLA-ED ppm	VLA-EC mg/m ³		
273-761-1	69012-64-2 112926-00-8 61790-53-2	Sílice, humos			véase Apartado 9 d	
		Fracción respirable	2			
		Sílice precipitada	10			
238-455-4	14464-46-1	Tierra de diatomeas (sin calcinar)			véase Apartado 9 d, e	
		Fracción inhalable	10			
		Fracción respirable	3			
238-878-4	14808-60-7	Sílice Cristalina: Cristobalita			véase Apartado 9,d	
		Fracción respirable	0,05			
239-487-1	15468-32-3 1317-95-9	Cuarzo			véase Apartado 9 d	
		Fracción respirable	0,1			
231-130-8	7440-21-3	Tridimita			véase Apartado 9 d	
		Fracción respirable	0,05			
232-752-2	9014-01-1	Tripoli			véase Apartado 9 d	
		Fracción respirable	0,1			
231-871-7	7773-06-0	Silicio			véase Apartado 9 d	
		Fracción inhalable	10			
231-871-7	7773-06-0	Fracción respirable	4		ñ	
		Soldadura, humos	5			
231-871-7	7773-06-0	Subtilisinas (enzimas proteolíticas como enzima pura cristalina al 100%)			Sen	37/38-41-42
231-871-7	7773-06-0	Sulfamato amónico	10			

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED ppm mg/m ³		VLA-EC ppm mg/m ³			
231-784-4	7727-43-7	Sulfato de bario		10			e	
233-331-6	10124-36-4	Sulfato de Cadmio					véase Apartado 7	45-46-60-61-25-26-48/23/25-50/53
231-900-3	7778-18-9	Sulfato de calcio		10			e	
232-104-9	7786-81-4	Sulfato de níquel, como Ni		0,1			Sen, r	22-40-42/43-50/53
201-058-1	77-78-1	Sulfato de dimetilo					véase Apartado 7	45-25-26-34-43-68
222-995-2	3689-24-5	Sulfotep		0,1			vía dérmica, VLBa, VLI,s	27/28-50/53
	75-18-3	Sulfuro de dimetilo		10				
215-147-8	1306-23-6	Sulfuro de Cadmio					véase Apartado 7	45-22-48/23/25-62-63-68-53
231-977-3	7783-06-4	Sulfuro de hidrógeno	10	14	15	21		12-26-50
240-841-2	16812-54-7	Sulfuro de níquel					véase Apartado 7	49-43-50/53
252-545-0	35400-43-2	Sulprofós		1			VLBa, s	
202-273-3	93-76-5	2,4,5-T		10			vía dérmica	22-36/37/38-50/53
238-877-9	14807-96-6	Talco (sin fibras de amianto) Fracción respirable		2			d, e	
238-877-9	14807-96-6	Talco (con fibras de amianto)		véase Amianto			p	
231-138-1	7440-28-0	Talio elemental y compuestos solubles, como TI		0,1			vía dérmica, c	26/28-33-53
231-135-5	7440-25-7	Tántalo		5				
		Metal, polvo						
231-135-5	7440-25-7	TDI					véase Diisocianato de 2,4- tolueno	

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
236-813-4	13494-80-9	Teluro		0,1				
215-135-2	1304-82-1	Teluro de bismuto						
		Sin dopar		10				
		Dopado con selenio, como Bi ₂ Te ₃		5				
222-191-1	3383-96-8	Temefós		10			VLBa, s, véase Apartado 9	
203-495-3	107-49-3	TEPP	0,004	0,05			vía dérmica, VLBa	27/28-50
247-477-3	26140-60-3	Terfenilos			0,52	5		
262-967-7	61788-32-7	Terfenilos hidrogenados	2	20	5	50		
215-540-4	1330-43-4 1303-96-4 11130-12-4	Tetraborato, sales sódicas						véase Apartado 9
		Anhidro		1				
		Decahidrato		5				
		Pentahidrato		1				
201-191-5	79-27-6	1,1,2,2-Tetrabromoetano	1	14			véase Apartado 9	26-36-52/53
		Tetrabromuro de acetileno			véase 1,1,2,2-Tetrabromoetano			
201-197-8	79-34-5	1,1,2,2-Tetracloroetano	1	7			vía dérmica, r	26/27-51/53
215-642-9	1335-88-2	Tetracloronaftaleno		2				
200-262-8	56-23-5	Tetracloruro de carbono	5	32	10	64	vía dérmica, r	23/24/25-40-48/23-52/53-59
204-126-9	116-14-3	Tetrafluoroetileno	2	8,3				
232-013-4	7783-60-0	Tetrafluoruro de azufre			0,1	0,45		

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
203-726-8	109-99-9	Tetrahidrofurano	50	150	100	300	vía dérmica, VLI, VLB	11-19-36/37
231-961-6	7782-65-2	Tetrahidruro de germanio	0,2	0,64				
	3333-52-6	Tetrametilsuccinonitrilo	0,5	2,8			vía dérmica	
208-094-7	509-14-8	Tetranitrometano	0,005	0,04				
207-531-9	479-45-8	Tetnilo		1,5				2-23/24/25-33
244-058-7	20816-12-0	Tetróxido de osmio, como Os	0,0002	0,002	0,0006	0,006		26/27/28-34
		Tierra de diatomeas (sin calcinar)			véase Sílice Amorfa			
202-525-2	96-69-5	4,4'-Tiobis (6-tercbutil-m-cresol)		10				
205-286-2	137-26-8	Tiram		1			Sen, ae	20/22-36/38-43-48/22-50/53
203-625-9	108-88-3	Tolueno	50	192	100	384	vía dérmica, VLB, VLI, r	11-38-48/20-63-65-67
202-429-0	95-53-4	o-Toluidina					véase Apartado 7	45-23/25-36-50
203-583-1	108-44-1	m-Toluidina	2	8,9			vía dérmica, VLBm	23/24/25-33-50
203-403-1	106-49-0	p-Toluidina	2	8,9			vía dérmica, VLBm	23/24/25-36-40-43-50
		Toxafeno			véase Canfeno clorado			
	77536-68-6	Tremolita			véase Amianto			45-48/23
200-854-6	75-25-2	Tribromometano	0,5	5,3			vía dérmica	23-36/38-51/53
233-657-9	10294-33-4	Tribromuro de boro			1	10		14-26/28-35
204-428-0	120-82-1	1,2,4-Triclorobenceno	2	15	5	38	vía dérmica, VLI, r	22-38-50/53

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS				NOTAS	FRASES R
			VLA-ED		VLA-EC			
			ppm	mg/m ³	ppm	mg/m ³		
200-756-3	71-55-6	1,1,1-Tricloroetano	100	555	200	1.110	VLB, r, VLI	20-59
201-166-9	79-00-5	1,1,2-Tricloroetano	10	56			vía dérmica, r	20/21/22-40-66
201-167-4	79-01-6	Tricloroetileno					véase Apartado 7	45-36/38-52/53-67-68
200-892-3	75-69-4	Triclorofluorometano			1.000	5.720		
200-663-8	67-66-3	Triclorometano	2	10			r, vía dérmica, VLI	22-38-40-48/20/22
215-321-3	1321-65-9	Tricloronaftaleno		5			vía dérmica	
200-930-9	76-06-2	Tricloronitrometano	0,1	0,7				22-26-36/37/38
200-936-1	76-13-1	1,1,2-Tricloro-1,2,2-trifluoretano	1.000	7.795	1.250	9.745		
231-749-3	7719-12-2	Tricloruro de fósforo	0,2	1,1	0,5	2,8		14-26/28-35-48/20
		Tridimita			véase Sílice Cristalina			
203-049-8	102-71-6	Trietanolamina		5				
204-469-4	121-44-8	Trietilamina	2	8,4	3	12,6	vía dérmica, f, VLI	11-20/21/22-35
210-035-5	603-34-9	Trifenilamina		5				

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS		NOTAS	FRASES R
			VLA-ED ppm	VLA-ED mg/m ³		
200-887-6	75-63-8	Trifluorobromometano	1.000	6.195		
231-569-5	7637-07-2	Trifluoruro de boro			1 3	14-26-35
232-230-4	7790-91-2	Trifluoruro de cloro			0,1 0,38	
232-007-1	7783-54-2	Trifluoruro de nitrógeno	10	30		VLBm
200-875-0	75-50-3	Trimetilamina	5	12	15 37	12-20-37/38-41
208-394-8	526-73-8	1,2,3-Trimetilbenceno	20	100		VLI
202-436-9	95-63-6	1,2,4-Trimetilbenceno	20	100		VLI 10-20-36/37/38-51/53
203-604-4	108-67-8	1,3,5-Trimetilbenceno	20	100		VLI 10-37-51/53
201-865-9	88-89-1	2,4,6-Trinitrofenol		0,1		2-4-23/24/25
204-289-6	118-96-7	2,4,6-Trinitrotolueno		0,1		vía dérmica, VLBm 2-23/24/25-33-51/53
		Trinitruro de sodio	véase Azida de sodio			
		Triortocresilfosfato	véase Fosfato de triortocresilo			
215-481-4	1327-53-3	Trióxido de diarsénico				véase Apartado 7 45-28-34-50/53
215-607-8	1333-82-0	Trióxido de cromo				véase Apartado 7 45-46-9-24/25-26-35-42/43-48/23-62-50/53
215-217-8	1314-06-3	Trióxido de diniquel				véase Apartado 7 49-43-53
		Trípoli	véase Sílice Cristalina			

EINECS	CAS	AGENTE QUÍMICO	LÍMITES ADOPTADOS		NOTAS	FRASES R
			VLA-ED ppm	VLA-ED mg/m ³		
231-143-9	7440-33-7	Tungsteno, como W Compuestos insolubles Compuestos solubles		5 1	10 3	c c
231-170-6	7440-61-1	Uranio (natural) , compuestos solubles e insolubles, como U		0,2	0,6	c
202-848-9	100-40-3	4-Vinilciclohexeno	0,1	0,45		
246-562-2	25013-15-4	Viniltolueno	50	246	100 492	
201-377-6	81-81-2	Warfarina		0,1		TR1 61-48/25-52/53
265-185-4	64742-82-1	White spirit (nafta de petróleo)	50	290	100 580	j, vía dérmica 65
		Wolframio	véase Tungsteno			
202-422-2	95-47-6	o-Xileno	50	221	100 442	vía dérmica, VLB, VLI 10-20/21-38
203-576-3	108-38-3	m-Xileno	50	221	100 442	vía dérmica, VLB, VLI 10-20/21-38
203-396-5	106-42-3	p-Xileno	50	221	100 442	vía dérmica, VLB, VLI 10-20/21-38
215-535-7	1330-20-7	Xilenos, mezcla isómeros	50	221	100 442	vía dérmica, VLB, VLI 10-20/21-38
		Xilidina , todos los isómeros	véase Dimetilaminobenceno			
231-442-4	7553-56-2	Yodo			0,1 1	20/21-50
200-874-5	75-47-8	Yodoformo	0,6	9,8		
232-223-6	7790-80-9	Yoduro de cadmio, como Cd				VLB,r 23/25-33-68-50/53
		Fracción inhalable		0,01		d
		Fracción respirable		0,002		d
200-819-5	74-88-4	Yoduro de metilo	2	12		vía dérmica 21-23/25-37/38-40

➤ United Kingdom⁹³

Substance	CAS Number	Workplace exposure limit				Comments	
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)			
		ppm	mg.m ⁻³	ppm	mg.m ⁻³		
Acetaldehyde	75-07-0	20	37	50	92	The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives	
Acetic anhydride	108-24-7	0.5	2.5	2	10		
Acetone	67-64-1	500	1210	1500	3620		
Acetonitrile	75-05-8	40	68	60	102		
o-Acetylsalicylic acid	50-78-2	-	5	-	-		
Acrylaldehyde (Acrolein)	107-02-8	0.1	0.23	0.3	0.7		
Acrylamide	79-06-1	-	0.3	-	-		Carc, Sk
Acrylonitrile	107-13-1	2	4.4	-	-		Carc, Sk
Allyl alcohol	107-18-6	2	4.8	4	9.7		Sk
Aluminium alkyl compounds		-	2	-	-		
Aluminium metal inhalable dust respirable dust	7429-90-5	-	10	-	-		
		-	4	-	-		

⁹³ Health and Safety Executive , 2011, EH40/2005 Workplace exposure limits

Substance	CAS Number	Workplace exposure limit				Comments
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)		
		ppm	mg.m ⁻³	ppm	mg.m ⁻³	
						The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives
Aluminium oxides inhalable dust respirable dust	1344-28-1	- -	10 4	- -	- -	
Aluminium salts, soluble		-	2	-	-	
2-Aminoethanol	141-43-5	1	2.5	3	7.6	Sk
Ammonia, anhydrous	7664-41-7	25	18	35	25	
Ammonium chloride, fume	12125-02-9	-	10	-	20	
Ammonium sulphamidate	7773-06-0	-	10	-	20	
Aniline	62-53-3	1	4	-	-	Sk
Antimony and compounds except stibine (as Sb)		-	0.5	-	-	
p-Aramid respirable fibres	26125-61-1	0.5 fibres/ ml		-	-	
Arsenic and arsenic compounds except arsine (as As)		-	0.1	-	-	Carc
Arsine	7784-42-1	0.05	0.16	-	-	
Asphalt, petroleum fumes	8052-42-4	-	5	-	10	
Azodicarbonamide	123-77-3	-	1.0	-	3.0	Sen
Barium compounds, soluble (as Ba)		-	0.5	-	-	
Barium sulphate inhalable dust respirable dust	7727-43-7	- -	10 4	- -	- -	
Benzene	71-43-2	1	3.25	-	-	Carc, Sk
Benzyl butyl phthalate	85-68-7	-	5	-	-	
Benzyl chloride	100-44-7	0.5	2.6	1.5	7.9	Carc
Beryllium and beryllium compounds (as Be)		-	0.002	-	-	Carc
Bis(2-ethylhexyl) phthalate	117-81-7	-	5	-	10	
Bis(chloromethyl) ether	542-88-1	0.001	0.005	-	-	Carc
Bisphenol A inhalable dust	80-05-7	-	10	-	-	
Bornan-2-one	77-22-2	2	13	3	19	

Substance	CAS Number	Workplace exposure limit				Comments
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)		
		ppm	mg.m ⁻³	ppm	mg.m ⁻³	
Boron tribromide	10294-33-4	-	-	1	10	The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives
Bromacil (ISO)	314-40-9	1	11	2	22	
Bromine	7726-95-6	0.1	0.66	0.2	1.3	
Bromomethane	74-83-9	5	20	15	59	Sk
Butane	106-97-8	600	1450	750	1810	Carc, (only applies if Butane contains more than 0.1% of buta-1,3-diene)
Buta-1,3-diene	106-99-0	10	22	-	-	Carc
Butan-1-ol	71-36-3	-	-	50	154	Sk
Butan-2-ol	78-92-2	100	308	150	462	
Butan-2-one (methyl ethyl ketone)	78-93-3	200	600	300	899	Sk, BMGV
2-Butoxyethanol	111-76-2	25	123	50	246	Sk, BMGV
2-(2-Butoxyethoxy) ethanol	112-34-5	10	67.5	15	101.2	
2-Butoxyethyl acetate	112-07-2	20	133	50	332	Sk
<i>n</i> -Butyl acrylate	141-32-2	1	5	5	26	
<i>n</i> -Butyl chloroformate	592-34-7	1	5.7	-	-	
<i>sec</i> -Butyl acetate	105-46-4	200	966	250	1210	
<i>tert</i> -Butyl acetate	540-88-5	200	966	250	1210	
Butyl acetate	123-86-4	150	724	200	966	
Butyl lactate	138-22-7	5	30	-	-	
2- <i>sec</i> -Butylphenol	89-72-5	5	31	-	-	Sk
Cadmium and cadmium compounds except cadmium oxide fume, cadmium sulphide and cadmium sulphide pigments (as Cd)		-	0.025	-	-	Carc (cadmium metal, cadmium chloride, fluoride and sulphate)
Cadmium oxide fume (as Cd)	1306-19-0	-	0.025	-	0.05	Carc

Substance	CAS Number	Workplace exposure limit				Comments
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)		
		ppm	mg.m ⁻³	ppm	mg.m ⁻³	
						The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives
Cadmium sulphide and cadmium sulphide pigments (respirable dust (as Cd))		-	0.03	-	-	Carc (cadmium sulphide)
Caesium hydroxide	21351-79-1	-	2	-	-	
Calcium carbonate inhalable dust respirable	1317-65-3	- -	10 4	- -	- -	
Calcium cyanamide	156-62-7	-	0.5	-	1	
Calcium hydroxide	1305-62-0	-	5	-	-	
Calcium oxide	1305-78-8	-	2	-	-	
Calcium silicate inhalable dust respirable	1344-95-2	- -	10 4	- -	- -	
Captan (ISO)	133-06-2	-	5	-	15	
Carbon black	1333-86-4	-	3.5	-	7	
Carbon dioxide	124-38-9	5000	9150	15000	27400	
Carbon disulphide	75-15-0	5	15	-	-	Sk
Carbon monoxide	630-08-0	30	35	200	232	BMGV
Carbon tetrachloride	56-23-5	2	13	-	-	Sk
Cellulose inhalable dust respirable	9004-34-6	- -	10 4	- -	20 -	
Chlorine	7782-50-5	-	-	0.5	1.5	
Chlorine dioxide	10049-04-4	0.1	0.28	0.3	0.84	
Chloroacetaldehyde	107-20-0	-	-	1	3.3	
2-Chloroacetophenone	532-27-4	0.05	0.32	-	-	
Chlorobenzene	108-90-7	1	4.7	3	14	Sk
Chlorodifluoromethane	75-45-6	1000	3590	-	-	
Chloroethane	75-00-3	50	134	-	-	
2-Chloroethanol	107-07-3	-	-	1	3.4	Sk
1-Chloro-2,3-epoxypropane (Epichlorohydrin)	106-89-8	0.5	1.9	1.5	5.8	Carc

Substance	CAS Number	Workplace exposure limit				Comments	
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)			
		ppm	mg.m ⁻³	ppm	mg.m ⁻³		
Chloroform	67-66-3	2	9.9	-	-	The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives	
Chloromethane	74-87-3	50	105	100	210		
1-Chloro-4-nitrobenzene	100-00-5	-	1	-	2		
Chlorosulphonic acid	7790-94-5	-	1	-	-		
Chlorpyrifos (ISO)	2921-88-2	-	0.2	-	0.6		
Chromium	7440-47-3	-	0.5	-	-		
Chromium (II) compounds (as Cr)		-	0.5	-	-		
Chromium (III) compounds (as Cr)		-	0.5	-	-		
Chromium (VI) compounds (as Cr)		-	0.05	-	-		Carc, sen, BMGV
Cobalt and Cobalt compounds (as Co)		-	0.1	-	-		Carc (cobalt dichloride and sulphate), Sen
Copper fume (as Cu)	7440-50-8	-	0.2	-	-		
Copper and compounds: dust and mists (as Cu)		-	1	-	2		
Cotton dust	(see paras 19-21)	-	2.5	-	-		
Cryofluorane (INN)	76-14-2	1000	7110	1250	8890		
Cumene	98-82-8	25	125	50	250		Sk
Cyanamide	420-04-2	0.58	1	-	-		Sk
Cyanides, except HCN, cyanogen and cyanogen chloride (as Cn)		-	5	-	-		Sk
Cyanogen chloride	506-77-4	-	-	0.3	0.77		
Cyclohexane	110-82-7	100	350	300	1050		
Cyclohexanol	108-93-0	50	208	-	-		
Cyclohexanone	108-94-1	10	41	20	82		Sk, BMGV
Cyclohexylamine	108-91-8	10	41	-	-		
2,4-D (ISO)	94-75-7	-	10	-	20		
Dialkyl 79 phthalate	83968-18-7	-	5	-	-		

Substance	CAS Number	Workplace exposure limit				Comments	
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)			
		ppm	mg.m ⁻³	ppm	mg.m ⁻³		
Diallyl phthalate	131-17-9	-	5	-	-	The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives	
Diatomaceous earth, natural, respirable dust	61790-53-2	-	1.2	-	-		
Dibenzoyl peroxide	94-36-0	-	5	-	-		
Dibismuth tritelluride	1304-82-1	-	10	-	20		
Diboron trioxide	1303-86-2	-	10	-	20		
1,2-Dibromoethane (Ethylene dibromide)	106-93-4	0.5	3.9	-	-		Carc, Sk
Dibutyl hydrogen phosphate	107-66-4	1	8.7	2	17		
Dibutyl phthalate	84-74-2	-	5	-	10		
Dichloroacetylene	7572-29-4	-	-	0.1	0.39		
1,2-Dichlorobenzene (ortho-dichlorobenzene)	95-50-1	25	153	50	306		Sk
1,4 Dichlorobenzene (para-dichlorobenzene)	106-46-7	25	153	50	306		
1,3-Dichloro-5,5-dimethyl-hydantoin	118-52-5	-	0.2	-	0.4		
1,1-Dichloroethane	75-34-3	100	-	-	-		Sk
1,2-Dichloroethane (Ethylene dichloride)	107-06-2	5	21	-	-		Carc, Sk
1,2-Dichloroethylene, cis:trans isomers 60:40	540-59-0	200	806	250	1010		
Dichlorofluoromethane	75-43-4	10	43	-	-		
Dichloromethane	75-09-2	100	350	300	1060		BMGV, Sk
2,2'-Dichloro-4,4'-methylene dianiline (MbOCA)	101-14-4	-	0.005	-	-		Carc, Sk, BMGV
Dicyclohexyl phthalate	84-61-7	-	5	-	-		
Dicyclopentadiene	77-73-6	5	27	-	-		
Diethylamine	109-89-7	5	15	10	30		
Diethyl ether	60-29-7	100	310	200	620		
Diethyl phthalate	84-66-2	-	5	-	10		
Diethyl sulphate	64-67-5	0.05	0.32	-	-	Carc, Sk	

Substance	CAS Number	Workplace exposure limit				Comments	
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)			
		ppm	mg.m ⁻³	ppm	mg.m ⁻³		
Dihydrogen selenide (as Se)	7783-07-5	0.02	0.07	0.05	0.17	The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives	
Diisobutyl phthalate	84-69-5	-	5	-	-		
Diisodecyl phthalate	26761-40-0	-	5	-	-		
Diisononyl phthalate	28553-12-0	-	5	-	-		
Diisooctyl phthalate	27554-26-3	-	5	-	-		
Diisopropylamine	108-18-9	5	21	-	-		
Diisopropyl ether	108-20-3	250	1060	310	1310		
<i>N,N</i> -Dimethylacetamide	127-19-5	10	36	20	72		Sk, BMGV
<i>N,N</i> -Dimethylaniline	121-69-7	5	25	10	50		Sk
<i>N,N</i> -Dimethylethylamine	598-56-1	10	30	15	46		
Dimethoxymethane	109-87-5	1000	3160	1250	3950		
Dimethylamine	124-40-3	2	3.8	6	11		
2-Dimethylaminoethanol	108-01-0	2	7.4	6	22		
Dimethyl ether	115-10-6	400	766	500	958		
<i>N,N</i> -Dimethylformamide	68-12-2	5	15	10	30		Sk
2,6-Dimethylheptan-4-one	108-83-8	25	148	-	-		
Dimethyl phthalate	131-11-3	-	5	-	10		
Dimethyl sulphate	77-78-1	0.05	0.26	-	-		Carc, Sk
Dinitrobenzene, all isomers	25154-54-5	0.15	1	0.5	3.5		Sk
Dinonyl phthalate	84-76-4	-	5	-	-		
1,4-Dioxane	123-91-1	20	73	-	-		Sk
Diphenylamine	122-39-4	-	10	-	20		
Diphenyl ether (vapour)	101-84-8	1	7.1	-	-		
Diphosphorus pentasulphide	1314-80-3	-	1	-	2		
Disphosphorus pentoxide	1314-56-3	-	1	-	2		
Diquat dibromide (ISO)	85-00-7	-	0.5	-	1		
Disodium disulphite	7681-57-4	-	5	-	-		
Disodium tetraborate, anhydrous	1330-43-4	-	1	-	-		

Substance	CAS Number	Workplace exposure limit				Comments	
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)			
		ppm	mg.m ⁻³	ppm	mg.m ⁻³		
Disodium tetraborate, decahydrate	1330-96-4	-	5	-	-	The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives	
Disodium tetraborate, pentahydrate	11130-12-4	-	1	-	-		
Disulphur dichloride	10025-67-9	-	-	1	5.6		
2,6-Di- <i>tert</i> -butyl- <i>p</i> -cresol	128-37-0	-	10	-	-		
6,6'-Di- <i>tert</i> -butyl-4,4'-thiodi- <i>m</i> -cresol	96-69-5	-	10	-	20		
Diuron (ISO)	330-54-1	-	10	-	-		
Emery inhalable dust respirable	1302-74-5	- -	10 4	- -	- -		
Endosulfan (ISO)	115-29-7	-	0.1	-	0.3		Sk
Enflurane	13838-16-9	50	383	-	-		
Ethane-1,2-diol particulate vapour	107-21-1	- 20	10 52	- 40	- 104		Sk
Ethanethiol	75-08-1	0.5	1.3	2	5.2		
Ethanol	64-17-5	1000	1920	-	-		
2-Ethoxyethanol	110-80-5	2	8	-	-		Sk
2-Ethoxyethyl acetate	111-15-9	2	11	-	-		Sk
2-Ethylhexyl chloroformate	24468-13-1	1	8	-	-		
Ethyl acetate	141-78-6	200	-	400	-		
Ethyl acrylate	140-88-5	5	21	10	42		
Ethylamine	75-04-7	2	3.8	6	11		
Ethylbenzene	100-41-4	100	441	125	552		Sk
Ethyl chloroformate	541-41-3	1	4.5	-	-		
Ethyl cyanoacrylate	7085-85-0	-	-	0.3	1.5		
Ethyl formate	109-94-4	100	308	150	462		
Ethylene oxide	75-21-8	5	9.2	-	-	Carc	
4-Ethylmorpholine	100-74-3	5	24	20	96	Sk	

Substance	CAS Number	Workplace exposure limit				Comments
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)		
		ppm	mg.m ⁻³	ppm	mg.m ⁻³	
Ferrous foundry particulate inhalable dust respirable dust	See paras 22-24	- -	10 4	- -	- -	The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives
Flour dust	See para 25	-	10	-	30	Sen
Fluoride (inorganic as F)	16984-48-8	-	2.5	-	-	
Fluorine	7782-41-4	1	1.6	1	1.6	
Formaldehyde	50-00-0	2	2.5	2	2.5	
Formamide	75-12-7	20	37	30	56	
Formic acid	64-18-6	5	9.6	-	-	
2-Furaldehyde (furfural)	98-01-1	2	8	5	20	Sk
Germane	7782-65-2	0.2	0.64	0.6	1.9	
Glutaraldehyde	111-30-8	0.05	0.2	0.05	0.2	Sen
Glycerol, mist	56-81-5	-	10	-	-	
Grain dust	See para 26	-	10	-	-	Sen
Graphite inhalable dust respirable	7440-44-0	- -	10 4	- -	- -	
Gypsum inhalable dust respirable	10101-41-4	- -	10 4	- -	- -	
Halogeno-platinum compounds (complex co-ordination compounds in which the platinum atom is directly co-ordinated to halide groups) (as Pt)	See paras 27-28	-	0.002	-	-	Sen
Halothane	151-67-7	10	82	-	-	
Hardwood dust	See paras 41-42	-	5	-	-	Carc, Sen
n-Heptane	142-82-5	500	2085	-	-	
Heptan-2-one	110-43-0	50	237	100	475	Sk
Heptan-3-one	106-35-4	35	166	100	475	Sk
n-Hexane	110-54-3	20	72	-	-	

Substance	CAS Number	Workplace exposure limit				Comments
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)		
		ppm	mg.m ⁻³	ppm	mg.m ⁻³	
1,6-Hexanolactam dust only dust and vapour	105-60-2	- -	1 10	- -	3 20	The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives
Hexan-2-one	591-78-6	5	21	-	-	
Hydrazine	302-01-2	0.02	0.03	0.1	0.13	
Hydrogen bromide	10035-10-6	-	-	3	10	
Hydrogen chloride (gas and aerosol mists)	7647-01-0	1	2	5	8	
Hydrogen cyanide	74-90-8	-	-	10	11	
Hydrogen fluoride (as F)	7664-39-3	1.8	1.5	3	2.5	
Hydrogen peroxide	7722-84-1	1	1.4	2	2.8	
Hydrogen sulphide	7783-06-4	5	7	10	14	
Hydroquinone	123-31-9	-	0.5	-	-	
4-Hydroxy-4-methylpentan-2-one	123-42-2	50	241	75	362	
2-Hydroxypropyl acrylate	999-61-1	0.5	2.7	-	-	
2,2'-Iminodi(ethylamine)	111-40-0	1	4.3	-	-	
Indene	95-13-6	10	48	15	72	
Indium and compounds (as In)		-	0.1	0	0.3	
Iodine	7553-56-2	-	-	0.1	1.1	
Iodoform	75-47-8	0.6	9.8	1	16	
Iodomethane	74-88-4	2	12	-	-	
Iron oxide, fume (as Fe)	1309-37-1	-	5	-	10	
Iron salts (as Fe)		-	1	-	2	
Isobutyl acetate	110-19-0	150	724	187	903	
Isocyanates, all (as -NCO) Except methyl isocyanate		- -	0.02	- -	0.07	
Isoflurane	26675-46-7	50	383	-	-	
Isocetyl alcohol (mixed isomers)	26952-21-6	50	271	-	-	
Isopentane	78-78-4	600	1800	-	-	
Isopropyl acetate	108-21-4	-	-	200	849	

Substance	CAS Number	Workplace exposure limit				Comments
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)		
		ppm	mg.m ⁻³	ppm	mg.m ⁻³	
Isopropyl chloroformate	108-23-6	1	5.1	-	-	The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives
Kaolin, respirable dust	1332-58-7	-	2	-	-	
Ketene	463-51-4	0.5	0.87	1.5	2.6	
Limestone total inhalable respirable	1317-65-3	- -	10 4	- -	- -	
Liquefied petroleum gas	68476-85-7	1000	1750	1250	2180	Carc (only applies if LPG contains more than 0.1% of buta-1,3-diene)
Lithium hydride	7580-67-8	-	0.025	-	-	
Lithium hydroxide	1310-65-2	-	-	-	1	
Magnesite inhalable dust respirable dust	546-93-0	- -	10 4	- -	- -	
Magnesium oxide (as Mg) inhalable dust fume and respirable dust	1309-48-4	- -	10 4	- -	- -	
Malathion (ISO)	121-75-5	-	10	-	-	Sk
Maleic anhydride	108-31-6	-	1	-	3	Sen
Manganese and its inorganic compounds (as Mn)		-	0.5	-	-	
Marble total inhalable respirable	1317-65-3	- -	10 4	- -	- -	
Mercaptoacetic acid	68-11-1	1	3.8	-	-	
Mercury and divalent inorganic compounds including mercuric oxide and mercuric chloride (measured as mercury)		-	0.02	-	-	
Methacrylic acid	79-41-4	20	72	40	143	
Methacrylonitrile	126-98-7	1	2.8	-	-	Sk

Substance	CAS Number	Workplace exposure limit				Comments	
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)			
		ppm	mg.m ⁻³	ppm	mg.m ⁻³		
Methanethiol	74-93-1	0.5	1.0	-	-	The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives	
Methanol	67-56-1	200	266	250	333		
2-Methoxyethanol	109-86-4	1	3	-	-		
2-(2-Methoxyethoxy) ethanol	111-77-3	10	50.1	-	-		
2-Methoxyethyl acetate	110-49-6	1	5	-	-		
(2-methoxymethylethoxy) propanol	34590-94-8	50	308	-	-		
1-Methoxypropan-2-ol	107-98-2	100	375	150	560		
1-Methoxypropyl acetate	108-65-6	50	274	100	548		
Methyl acetate	79-20-9	200	616	250	770		
Methyl acrylate	96-33-3	5	18	10	36		
3-Methylbutan-1-ol	123-51-3	100	366	125	458		
Methyl cyanoacrylate	137-05-3	-	-	0.3	1.4		
4,4'-Methylenedianiline	101-77-9	0.01	0.08	-	-		Carc, Sk, BMGV
Methyl ethyl ketone peroxides (MEKP)	1338-23-4	-	-	0.2	1.5		
Methyl methacrylate	80-62-6	50	208	100	416		
2-Methylcyclohexanone	583-60-8	50	233	75	350		
Methylcyclohexanol	25639-42-3	50	237	75	356		
Methyl isocyanate (as -NCO)	624-83-9			0.02			Sen
<i>N</i> -Methylaniline	100-61-8	0.5	2.2	-	-		Sk
<i>n</i> -Methyl-2-pyrrolidone	872-50-4	10	40	20	80		Sk
5-Methylheptan-3-one	541-85-5	10	53	20	107		
5-Methylhexan-2-one	110-12-3	20	95	100	475		Sk
2-Methylpentane-2,4-diol	107-41-5	25	123	25	123		
4-Methylpentan-2-ol	108-11-2	25	106	40	170		Sk
4-Methylpentan-2-one	108-10-1	50	208	100	416	Sk, BMGV	
2-Methylpropan-1-ol	78-83-1	50	154	75	231		
2-Methylpropan-2-ol	75-65-0	100	308	150	462		
Methyl- <i>tert</i> -butyl-ether	1634-04-4	50	183.5	100	367		

Substance	CAS Number	Workplace exposure limit				Comments
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)		
		ppm	mg.m ⁻³	ppm	mg.m ⁻³	
Mica total inhalable respirable	12001-26-2	- -	10 0.8	- -	- -	The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives
MMMF (Machine-made mineral fibre) (except for refractory ceramic fibres and special purpose fibres)		5mg. m ⁻³ and 2 fibres/ millilitre				
Molybdenum compounds (as Mo) soluble compounds insoluble compounds		- -	5 10	- -	10 20	
Monochloroacetic acid	79-11-8	0.3	1.2	-	-	Sk
Morpholine	110-91-8	10	36	20	72	Sk
Neopentane	463-82-1	600	1800	-	-	
Nickel and its inorganic compounds (except nickel tetracarbonyl): water-soluble nickel compounds (as Ni) nickel and water-insoluble nickel compounds (as Ni)		- -	0.1 0.5	- -	- -	Sk, Carc (nickel oxides and sulphides) Sen (nickel sulphate)
Nicotine	54-11-5	-	0.5	-	1.5	
Nitric acid	7697-37-2	-	-	1	2.6	
Nitrobenzene	98-95-3	0.2	1	-	-	Sk
Nitromethane	75-52-5	100	254	150	381	
2-Nitropropane	79-46-9	5	19	-	-	Carc
Nitrous oxide	10024-97-2	100	183	-	-	
Orthophosphoric acid	7664-38-2	-	1	-	2	
Osmium tetroxide (as Os)	20816-12-0	0.0002	0.002	0.0006	0.006	
Oxalic acid	144-62-7	-	1	-	2	
2,2'-Oxydiethanol	111-46-6	23	101	-	-	
Ozone	10028-15-6	-	-	0.2	0.4	
Paracetamol, inhalable dust	103-90-2	-	10	-	-	

Substance	CAS Number	Workplace exposure limit				Comments	
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)			
		ppm	mg.m ⁻³	ppm	mg.m ⁻³		
Paraffin wax, fume	8002-74-2	-	2	-	6	The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives	
Paraquat dichloride (ISO), respirable dust	1910-42-5	-	0.08	-	-		
Pentacarbonyliron (as Fe)	13463-40-6	0.01	0.08	-	-		
Pentaerythritol inhalable dust respirable dust	115-77-5	-	10	-	20		
		-	4	-	-		
Pentan-2-one	107-87-9	200	716	250	895		
Pentan-3-one	96-22-0	200	716	250	895		
Pentane	109-66-0	600	1800	-	-		
Pentyl acetates (all isomers)		50	270	100	541		
2-Phenylpropene	98-83-9	50	246	100	491		
Phenol	108-95-2	2	7.8	4	16		Sk
p-Phenylenediamine	106-50-3	-	0.1	-	-		Sk
Phorate (ISO)	298-02-2	-	0.05	-	0.2		Sk
Phosgene	75-44-5	0.02	0.08	0.06	0.25		
Phosphine	7803-51-2	0.1	0.14	0.2	0.28		
Phosphorus pentachloride	10026-13-8	0.1	0.87	0.2	2		
Phosphorus trichloride	7719-12-2	0.2	1.1	0.5	2.9		
Phosphorus, yellow	7723-14-0	-	0.1	-	0.3		
Phosphoryl trichloride	10025-87-3	0.2	1.3	0.6	3.8		
Phthalic anhydride	85-44-9	-	4	-	12		Sen
Picloram (ISO)	1918-02-1	-	10	-	20		
Picric acid	88-89-1	-	0.1	-	0.3		
Piperazine	110-85-0	-	0.1	-	0.3		Sen
Piperazine dihydrochloride	142-64-3	-	0.1	-	0.3	Sen	
Piperidine	110-89-4	1	3.5	-	-	Sk	
Plaster of Paris inhalable dust respirable dust	26499-65-0	-	10	-	-		
		-	4	-	-		

Substance	CAS Number	Workplace exposure limit				Comments
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)		
		ppm	mg.m ⁻³	ppm	mg.m ⁻³	
Platinum compounds, soluble (except certain halogeno-Pt compounds) (as Pt)		-	0.002	-	-	The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives
Platinum metal	7440-06-4	-	5	-	-	
Polychlorinated biphenyls (PCB)	1336-36-3	-	0.1	-	-	Sk
Polyvinyl chloride inhalable dust respirable dust	9002-86-2	- -	10 4	- -	- -	
Portland cement inhalable dust respirable dust	65997-15-1	- -	10 4	- -	- -	
Potassium hydroxide	1310-58-3	-	-	-	2	
Propane-1,2-diol total vapour and particulates particulates	57-55-6	150 -	474 10	- -	- -	
Propan-1-ol	71-23-8	200	500	250	625	Sk
Propan-2-ol	67-63-0	400	999	500	1250	
Propionic acid	79-09-4	10	31	15	46	
Propoxur (ISO)	114-26-1	-	0.5	-	2	
Propranolol	525-66-6	-	2	-	6	
n-Propyl acetate	109-60-4	200	849	250	1060	
Propylene oxide	75-56-9	5	12	-	-	Carc
Prop-2-yn-1-ol	107-19-7	1	2.3	3	7	Sk
Pulverised fuel ash inhalable dust respirable dust		- -	10 4	- -	- -	
Pyrethrum (purified of sensitising lactones)	8003-34-7	-	1	-	-	
Pyridine	110-86-1	5	16	10	33	
2-Pyridylamine	504-29-0	0.5	2	2	7.8	

Substance	CAS Number	Workplace exposure limit				Comments
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)		
		ppm	mg.m ⁻³	ppm	mg.m ⁻³	
Pyrocatechol	102-80-9	5	23	-	-	The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives
Refractory ceramic fibres and special purpose fibres		5mg.m ⁻³ 1 fibre/millilitre		-	-	
Resorcinol	108-46-3	10	46	20	92	Sk
Rhodium (as Rh) metal fume and dust soluble salts		-	0.1 0.001	-	0.3 0.003	
Rosin-based solder flux fume	8050-09-7	-	0.05	-	0.15	Sen
Rotenone (ISO)	83-79-4	-	5	-	10	
Rouge total inhalable respirable	1309-37-1	-	10 4	-	-	
Rubber fume	See paras 33-37	-	0.6	-	-	Carc, limit relates to cyclohexane soluble material
Rubber process dust	See paras 33-37	-	6	-	-	Carc
Selenium and compounds, except hydrogen selenide (as Se)		-	0.1	-	-	
Silane	7803-62-5	0.5	0.67	1	1.3	
Silica, amorphous inhalable dust respirable dust		-	6 2.4	-	-	
Silica, respirable crystalline		-	0.1	-	-	
Silica, fused respirable dust	60676-86-0	-	0.08	-	-	
Silicon inhalable dust respirable dust	7440-21-3	-	10 4	-	-	
Silicon carbide (not whiskers) total inhalable respirable	409-21-2	-	10 4	-	-	

Substance	CAS Number	Workplace exposure limit				Comments
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)		
		ppm	mg.m ⁻³	ppm	mg.m ⁻³	
Silver (soluble compounds as Ag)		-	0.01	-	-	The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives
Silver, metallic	7440-22-4	-	0.1	-	-	
Sodium azide (as NaN ₃)	26628-22-8	-	0.1	-	0.3	Sk
Sodium 2-(2,4-dichlorophenoxy) ethyl sulphate	136-78-7	-	10	-	20	
Sodium hydrogen sulphite	7631-90-5	-	5	-	-	
Sodium hydroxide	1310-73-2	-	-	-	2	
Softwood dust	See paras 41-42	-	5	-	-	Sen
Starch total inhalable respirable	9005-25-8	- -	10 4	- -	- -	
Styrene	100-42-5	100	430	250	1080	
Subtilisins	1395-21-7 (<i>Bacillus subtilis</i> BPN) 9014-01-1 (<i>Bacillus subtilis</i> Carlsberg)	-	0.00004	-	-	Sen
Sucrose	57-50-1	-	10	-	20	
Sulfotep (ISO)	3689-24-5	-	0.1	-	-	Sk
Sulphur hexafluoride	2551-62-4	1000	6070	1250	7590	
Sulphuric acid (mist)	7664-93-9		0.05			The mist is defined as the thoracic fraction
Sulphuryl difluoride	2699-79-8	5	21	10	42	
Talc, respirable dust	14807-96-6	-	1	-	-	
Tantalum	7440-25-7	-	5	-	10	
Tellurium and compounds, except hydrogen telluride (as Te)		-	0.1	-	-	

Substance	CAS Number	Workplace exposure limit				Comments
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)		
		ppm	mg.m ⁻³	ppm	mg.m ⁻³	
Terphenyls, all isomers	26140-60-3	-	-	0.5	4.8	The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives
1,1,2-Tetrabromoethane	79-27-6	0.5	7.2	-	-	
Tertiary-butyl-methyl-ether	1634-04-4	50	183.5	100	367	
Tetracarbonylnickel (as Ni)	13463-39-3	-	-	0.1	0.24	
Tetrachloroethylene	127-18-4	50	345	100	689	
1,1,1,2-Tetrafluoroethane (HFC 134a)	811-97-2	1000	4240	-	-	
Tetrahydrofuran	109-99-9	50	150	100	300	
Tetrasodium pyrophosphate	7722-88-5	-	5	-	-	
Thallium, soluble compounds (as Tl)		-	0.1	-	-	
Thionyl chloride	7719-09-7	-	-	1	4.9	
Tin compounds, inorganic except SnH ₄ , (as Sn)		-	2	-	4	
Tin compounds, organic, except Cyhexatin (ISO), (as Sn)		-	0.1	-	0.2	
Titanium dioxide total inhalable respirable	13463-67-7	- -	10 4	- -	- -	
Toluene	108-88-3	50	191	100	384	
p-Toluenesulphonyl chloride	98-59-9	-	-	-	5	
o-Toluidine	95-53-4	0.2	0.89	-	-	
Tributyl phosphate, all isomers	126-73-8	-	5	-	5	
1,2,4-Trichlorobenzene	120-82-1	1	-	5	-	
1,1,1-Trichloroethane	71-55-6	100	555	200	1110	
Trichloroethylene	79-01-6	100	550	150	820	
Trichloronitromethane	76-06-2	0.1	0.68	0.3	2.1	
Triethylamine	121-44-8	2	8	4	17	
Triglycidyl isocyanurate (TGIC)	2451-62-9	-	0.1	-	-	

Substance	CAS Number	Workplace exposure limit				Comments
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)		
		ppm	mg.m ⁻³	ppm	mg.m ⁻³	
Trimellitic anhydride	552-30-7	-	0.04	-	0.12	The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to substances identified in IOELV Directives
Trimethylbenzenes, all isomers or mixtures	25551-13-7	25	125	-	-	
3,5,5-trimethylcyclohex-2-enone	78-59-1	-	-	5	29	
Trimethyl phosphite	121-45-9	2	10	-	-	
2,4,6-Trinitrotoluene	118-96-7	-	0.5	-	-	Sk
Tri- <i>o</i> -tolyl phosphate	78-30-8	-	0.1	-	0.3	
Triphenyl phosphate	115-86-6	-	3	-	6	
Tungsten and compounds (as W)	7440-33-7	-	1	-	3	
soluble compounds		-	5	-	10	
insoluble compounds and others		-	-	-	-	
Turpentine	8006-64-2	100	566	150	850	
Vanadium pentoxide	1314-62-1	-	0.05	-	-	
Vinyl acetate	108-05-4	5	17.6	10	35.2	
Vinyl chloride	75-01-4	3	7.8	-	-	Carc
Vinylidene chloride	75-35-4	10	40	-	-	
Wool process dust	See para 43	-	10	-	-	
Xylene, <i>o</i> -, <i>m</i> -, <i>p</i> - or mixed isomers	1330-20-7	50	220	100	441	Sk, BMGV
Yttrium	7440-65-5	-	1	-	3	
Zinc chloride, fume	7646-85-7	-	1	-	2	
Zinc distearate	557-05-1	-	10	-	20	
inhalable dust		-	4	-	-	
respirable dust		-	-	-	-	
Zirconium compounds (as Zr)		-	5	-	10	