



Health Effects of Hazardous Substances

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1st Edition

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TABLE OF CONTENTS

Acetone	08
Ammonia	10
Benzene	12
Butanol	14
Carbon dioxide	16
Carbon monoxide	18
Chlorine	20
Ethanol	22
Formaldehyde	24
Hydrazine	26
Hydrogen	28
Hydrogen Chloride	30
Hydrogen Cyanide	32
Hydrogen Fluoride	34
Hydrogen Peroxide Solution	36
Hydrogen Phosphide	38
Hydrogen Sulfide	40
Methane	42
Methanol	44
Methylamine Anhydrous	46
Naphthalene	48
Nitrogen Monoxide	50
Nitrogen Dioxide	52
Octane	54
Ozone	56
Propane	58
Sulfur	60
Sulfur Dioxide	62
Toluene	64
Xylene, Mixture of Isomers	66

C ₁₀ H ₈	48
C ₂ H ₆ O	22
C ₃ H ₆ O	08
C ₃ H ₈	58
C ₄ H ₁₀ O	14
C ₆ H ₆	12
C ₇ H ₈	64
C ₈ H ₁₀	66
C ₈ H ₁₈	54
CH ₂ O	24
CH ₄	42
CH ₄ O	44
CH ₅ N	46
Cl ₂	20
CO	18
CO ₂	16
H ₂	32
H ₂ O ₂	36
H ₂ S	40
H ₃ P	38
HCl	28
HCN	30
HF	34
N ₂ H ₄	26
NH ₃	10
NO	50
NO ₂	52
O ₃	56
S	60
SO ₂	62

SUBSTANCE OCCURRENCE BY INDUSTRY

Oil & Gas Exploration

Ammonia	10
Carbon Monoxide	18
Hydrogen Fluoride	34
Hydrogen Sulfide	40
Sulfur	60
Sulfur Dioxide	62

Petrochemical Industry

See Oil & Gas Exploration

Chemical Industry

Ammonia	10
Carbon Dioxide	16
Carbon Monoxide	18
Chlorine	20
Ethanol	22
Hydrogen	28
Hydrogen Sulfide	40
Hydrogen Chloride	30
Hydrogen Peroxide Solution	36
Methane	42
Methanol	44
Methyamine Anhydrous	46
Ozone	56
Propane	58
Sulfur Dioxide	62

Metal & Heavy Industry


Ammonia	10
Benzene	12
Butanol	14
Carbon Dioxide	16

Carbon Monoxide	18
Chlorine	20
Ethanol	22
Formaldehyde	24
Hydrogen	28
Hydrogen Peroxide Solution	36
Hydrogen Phosphide	38
Hydrogen Sulfide	40
Methane	42
Methanol	44
Naphtalene	48
Nitrogen Dioxide	52
Nitrogen Monoxide	50
Propane	58
Sulphur Dioxide	62
Toluene	64
Xylene	66

Producing & Processing Industry

Acetone	08
Ammonia	10
Benzene	12
Butanol	14
Carbon Dioxide	16
Carbon Monoxide	18
Chlorine	20
Ethanol	22
Formaldehyde	24
Hydrazine Cyanide	32
Hydrogen Peroxide Solution	36
Methanol	44
Naphtalene	48
Octane	54

Acetone

Formula	C ₃ H ₆ O	
CAS No.	67-64-1	
Synonyms	Propan-2-one Dimethylformaldehyde Dimethylketal Dimethyl ketone Ketone propane Methyl acetyl Methyl ketone Pyroacetic ether	
State of Aggregation	At 1,013 mbar / 20 °C: liquid (colorless)	
LEL	2.5 vol. % / 60 g/m ³	
UEL	14.3 vol. % / 345 g/m ³	
Flash point	-20 °C	
Ignition point	345 °C at 2 bar; 290 °C at 4 bar; 265 °C at 6.8 bar; 250 °C at 16.5 bar	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	500 / 1,210	1,500 / 3,620
NL	- / 1,210	- / 2,420
DK	250 / 600	(500 / 1,200) ¹
NO	125 / 295	-
FIN	500 / 1,200	630 / 1,500
SE	250 / 600	500 / 1,200
Lowest value (EU)	500 / 1,210	-

Concentration	Acute health effects	Detection Devices	Protection Devices
100 ppm	Odor threshold (for non-adapted persons). Irritation to the mucous membranes is not noticeable.	Tubes, CMS, portable gas detectors	Half masks, fullface masks, splash suits, gas-tight CPS
>250 ppm	Non-adapted persons feel slight irritation	Tubes, CMS, portable gas detectors	Half masks, fullface masks, splash suits, gas-tight CPS
2,500 ppm	Irritation to the mucous membranes at 2,500 ppm long-term.	Tubes	Half masks, fullface masks, splash suits, gas-tight CPS
> 5,000 ppm	Acute risk begins: symptoms may be irritation to the airways, headache, excitation, red color of the face, weakness, increased salivation, nausea, vomiting, stupor, respiratory disturbances, unconsciousness through to coma (sometimes after a latency period of some hours).	Tubes	Half masks, fullface masks, splash suits, gas-tight CPS
9,300 ppm	Volunteers (probably non-adapted) could not tolerate 9,300 ppm for more than 5 minutes because of severe irritation to the throat.	Tubes	Half masks, fullface masks, splash suits, gas-tight CPS

Ammonia

Formula	NH ₃
CAS No.	7664-41-7
Synonyms	Ammonia, anhydrous Anhydrous ammonia
State of Aggregation	At 1,013 mbar / 20 °C: gaseous (colorless), liquified in high pressure gas cylinders
LEL	15.4 vol. % / 108 g/m ³
UEL	33.6 vol. % / 240 g/m ³
Flash point	n.a.
Ignition point	630 °C


GHS symbols



Limit values	TWA	STEL
	ppm / mg/m ³	ppm / mg/m ³
UK	25 / 18	35 / 25
NL	- / 14	-
DK	20 / 14	40 / 28
NO	25 / 18	-
FIN	-	-
SE	25 / 18	50 / 35
Lowest value (EU)	20 / 14	50 / 36

Concentration	Acute health effects	Detection Devices	Protection Devices
20 – 30 ppm	Initial exposure of as little as 20 – 30 ppm can cause slight irritation.	Tubes, CMS, portables gas detectors, stationary gas detection	Half masks, fullface masks, PAPR, gas-tight CPS
> 100 ppm	After accustomization (which may occur within a matter of hours or over a longer term of 1 – 2 weeks) higher exposure at least up to 100 ppm can be tolerated.	Tubes, CMS, portables gas detectors, stationary gas detection	Half masks, fullface masks, PAPR, gas-tight CPS
300 ppm	A level of 300 ppm is probably intolerable even after an acclimatization period. Symptoms registered at high levels of exposure are: cough, breathing difficulties, increased breathing rate, nausea, vomiting, disturbed sense of smell, later also inflammation of the respiratory passages.	Tubes, CMS, portables gas detectors, stationary gas detection	Half masks, fullface masks, PAPR, gas-tight CPS
1,700 ppm	1,700 ppm and upwards may be lethal as a result of damage to the respiratory tract.	CMS, portables gas detectors	Fullface masks, gas-tight CPS

Benzene

Formula	C ₆ H ₆	
CAS No.	71-43-2	
Synonyms	Benzol	
State of Aggregation	At 1,013 mbar / 20 °C: liquid (colorless)	
LEL	1.2 vol. % / 39 g/m ³	
UEL	8.6 vol. % / 280 g/m ³	
Flash point	-11 °C	
Ignition point	555 °C	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	1 / 3.25	-
NL	-	-
DK	0.5 / 1.6	(1.0 / 3.2) ¹
NO	1 / 3	-
FIN	-	-
SE	0.5 / 1.5	3 / 9
Lowest value (EU)	1	-

Concentration	Acute health effects	Detection Devices	Protection Devices
< 500 ppm	Vertigo, dazed feeling, headache and retching	Short-term-Tubes, CMS, portable gas detectors	Fullface masks, gas-tight CPS, splash suits
> 500 ppm	Excitation and cramps, cardiac dysrhythmia, unconsciousness, respiratory depression	CMS, portable gas detectors	Gas-tight CPS, splash suits
1,500 ppm	Severe symptoms like above; 1,500 ppm only tolerable for 60 min.	CMS, portable gas detectors	Gas-tight CPS, splash suits
3,000 ppm	3,000 ppm are only tolerable for approx. 30 min.	Portable gas detectors	Gas-tight CPS, splash suits
7,000 ppm	7,000 ppm become life threatening after 30 – 60 minutes	-	Gas-tight CPS, splash suits
> 20,000 ppm	Concentrations from approx. 20,000 ppm upwards cause death within minutes (due to respiratory paralysis or cardiac arrest).	-	Gas-tight CPS, splash suits

Butanol

Formula	C ₄ H ₁₀ O
CAS No.	71-36-3
Synonyms	n-Butanol Butyl alcohol n-Butylalcohol Butyric alcohol 1-Hydroxybutane Methylolpropane
State of Aggregation	At 1,013 mbar / 20 °C: liquid
LEL	1.7 vol. % / 52 g/m ³
UEL	11.3 vol. % / 350 g/m ³
Flash point	35 °C
Ignition point	325 °C


GHS symbols



Limit values	TWA	STEL
	ppm / mg/m ³	ppm / mg/m ³
UK	- / -	50 / 154
NL	- / -	- / -
DK	50 / 150	50 / 150
NO	25 / 75	- / -
FIN	- / -	- / -
SE	15 / 45	(30 / 90) ¹
Lowest value (NIOSH)	100 / 300	- / -


Concentration	Acute health effects	Detection Devices	Protection Devices
> 0.1 ppm	For inhalative exposure, the odor is already noticeable. However, under prolonged exposure the odor threshold is considerably higher due to adaptation.	Portable gas detectors	Half masks, fullface masks, PAPR, gas-tight CPS
25 – 50 ppm and 100 – 200 ppm	In an experiment on volunteers, exposure to 25 ppm for 3 – 5 min caused slight irritation to the eyes, nose and throat but to 50 ppm severe irritation to the throat and sometimes also headache. On the other hand, in a more recent test, volunteers apparently tolerated 100 or 200 ppm for 2 hours without distinct complaints.	Tubes, Portable gas detectors	Half masks, fullface masks, PAPR, gas-tight CPS
200 ppm	Inflammatory changes to the cornea observed under occupational exposure to 200 ppm are considered to be more likely a consequence of repeated exposure.	Tubes, Portable gas detectors	Half masks, fullface masks, PAPR, gas-tight CPS
> 1,270 ppm	Intolerable irritation to the airways is expected (tussive irritation, respiratory retention, etc.)	Tubes, Portable gas detectors	Half masks, fullface masks, gas-tight CPS
> 1,400 ppm	Based on animal experiments, concentrations > 1,400 ppm are estimated to be acutely life threatening.	Tubes, Portable gas detectors	Half masks, fullface masks, gas-tight CPS

Carbon Dioxide

Formula	CO ₂	
CAS No.	124-38-9	
Synonyms	Carbonic acid gas Carbonic anhydride Carbonic oxide Carbon oxide	
State of Aggregation	At 1,013 mbar / 20 °C: gaseous (colorless)	
LEL	n.a.	
UEL	n.a.	
Flash point	n.a.	
Ignition point	n.a.	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	5,000 / 9,150	15,000 / 27,400
NL	- / 9,000	-
DK	5,000 / 9,000	(10,000 / 18,000) ¹
NO	5,000 / 9,000	-
FIN	5,000 / 9,100	-
SE	5,000 / 9,000	10,000 / 18,000
Lowest value (EU)	5,000 / 9,000	-

Concentration	Acute health effects	Detection Devices	Protection Devices
0.1 vol %	Inhalation of 0.1 vol.% by sensitive persons who stayed in closed, artificially conditioned rooms already produced pressure sensations in the head and headache. However, the critical effect following inhalative short-term exposure consists in acidosis.	Tubes, CMS, portable gas detectors, stationary gas detection	Gas-tight CPS
1 vol.%	For volunteers who were physically moderately loaded, it became distinct when they were exposed to 1 vol.% (10000 ppm) for 30 minutes.	Tubes, CMS, portable gas detectors	Gas-tight CPS
5 vol.%	5 vol.% for 30 min: strong activation of the blood supply to the kidneys and brain	Tubes, CMS, portable gas detectors	Gas-tight CPS
6 vol %	6 vol.% for 6 – 8 min: changes to the ECG (more distinctly pronounced for older persons; > 60 years old);	Tubes, CMS, portable gas detectors	Gas-tight CPS
> 10 vol. %	1.5 up to 7 minutes: strong activation of the cardiac action, headache, vertigo, enlarged pupils, myoclonic jerks; 10 – 20 min: loss of consciousness; on the other hand, it was reported that some persons have allegedly tolerated concentrations of 10 vol.% for up to 1 hour without apparent hazard.	Tubes, CMS, portable gas detectors	Gas-tight CPS
20 – 30 vol. %	About 1 min: anaesthesia, unconsciousness, cramps, changes to the EEG and ECG and serious eye damage (retinal degeneration).	Tubes, CMS, portable gas detectors	Gas-tight CPS

Carbon Monoxide

Formula	CO	
CAS No.	630-08-0	
Synonyms	Monoxide of carbon Carbonic oxide Carbon oxide	
State of Aggregation	At 1,013 mbar/20 °C: gaseous (colorless)	
LEL	relative air humidity < 10 %: 11.3 vol. % / 131 g/m ³ relative air humidity > 80 %: 10.9 vol. % / 129 g/m ³	
UEL	relative air humidity < 10 %: 75.6 vol. % / 877 g/m ³ relative air humidity > 80 %: 76 vol. % / 901 g/m ³	
Flash point	-191.6 °C	
Ignition point	605 °C	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	30 / 35	200 / 232
NL	- / 29	-
DK	25 / 29	(50 / 58) ¹
NO	25 / 29	-
FIN	30 / 35	75 / 87
SE	35 / 40	100 / 120
Lowest value (EU)	20 / 23	100 / 117

Concentration	Acute health effects	Detection Devices	Protection Devices
Generally	Deficiency of oxygen in the body tissues as a consequence of partial inhibition of the transport of oxygen in the blood; in particular disturbance of the heart/circulatory system and neurological effects; metabolic disturbances. CO is a tasteless, odorless and colorless, non-corrosive gas. Consequently, no irritative reactions to the mucous membranes and skin are to be expected and none have been found.	Tubes, CMS, portables gas detectors, stationary gas detection	Fullface masks, gas-tight CPS
5,000 – 6,000 ppm	No serious and reproducible substance-specific effects on individual functional parameters of volunteers' lungs were found, not even at concentrations of 5,000 ppm for 2 – 3 min or 6,000 ppm for 18 seconds.	Portable gas detectors	Fullface masks, gas-tight CPS
1,500 – 40,000 ppm	The following combinations of concentration and duration of exposure are thought to be potentially lethal for humans: 40,000 ppm x 2 min, 16,000 ppm x 5 min, 8,000 ppm x 10 min, 3,000 ppm x 30 min, 1,500 ppm x 60 min.	Tubes, portable gas detectors	Fullface masks, gas-tight CPS

Chlorine

Formula	Cl ₂
CAS No.	7782-50-5
Synonyms	E 925 Molecular chlorine
State of Aggregation	At 1,013 mbar / 20 °C: gaseous (chartreuse)
LEL	n.a.
UEL	n.a.
Flash point	n.a.
Ignition point	n.a.

GHS symbols



Limit values	TWA	STEL
	ppm / mg/m ³	ppm / mg/m ³
UK	–	0.5 / 1.5
NL	–	– / 1.5
DK	(0.25 / 0.75) ¹	(0.25 / 0.75) ¹
NO	0.5 / 1.5	–
FIN	–	0.5 / 1.5
SE	0.5 / 1.5	1 / 3
Lowest value (EU)	–	0.5 / 1.5

Concentration	Acute health effects	Detection Devices	Protection Devices
Generally	Strong irritation of the respiratory tract, eyes and skin. Late pulmonary damage.	Tubes, CMS, portable gas detectors, stationary gas detection	Half masks, fullface masks, PAPR, gas-tight CPS
No health data per level of concentration	–	–	–

Ethanol

Formula	C ₂ H ₆ O
CAS No.	64-17-5
Synonyms	Ethyl alcohol Ethyloxidhydrate Alcohol Methyl carbinol Ethylic alcohol Ethyl hydroxide
State of Aggregation	At 1,013 mbar / 20 °C: liquid (colorless)
LEL	3.1 vol. %
UEL	27.7 vol. % Temperature 100 °C, larger ignition chamber, UEL in standard apparatus: 23 vol. %
Flash point	12 °C, closed cup 22 °C, 70 % by volume 22 °C, 60 % by volume 24 °C, 50 % by volume 28 °C, 40 % by volume 29 °C, 30 % by volume
Ignition point	400 °C


GHS symbols



Limit values	TWA	STEL
	ppm / mg/m ³	ppm / mg/m ³
UK	1,000 / 1,920	–
NL	– / 260	– / 1,900
DK	1,000 / 1,900	(2,000 / 3,800) ¹
NO	500 / 950	–
FIN	1,000 / 1,900	1,300 / 2,500
SE	500 / 1,000	1,000 / 1,900
Lowest value (NIOSH)	1,000 / 1,920	–

Concentration	Acute health effects	Detection Devices	Protection Devices
80 ppm	Odor is noticeable	Portable gas detectors	Half masks, fullface masks, PAPR
Varying from 100 to 1,900 ppm	For hourly varying exposures of 100 and 1,900 ppm, the high concentration caused abnormal perception (annoyance, minor irritation) which, however, were rapidly reversible.	Portable gas detectors	Fullface masks, PAPR
> 10,000 ppm	Threshold for eye irritation	Portable gas detectors	Fullface masks, PAPR

Formaldehyde

Formula	CH ₂ O	
CAS No.	50-00-0	
Synonyms	Formol Methylaldehyde Methylen glycol Methylen oxide	
State of Aggregation	At 1,013 mbar/20 °C: gaseous (usual in trade as aqueous solution)	
LEL	7 vol. % / 87 g/m ³	
UEL	73 vol. % / 910 g/m ³	
Flash point	32 – 61 °C	
Ignition point	430 °C	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	2 / 2.5	2 / 2.5
NL	– / 0.15	– / 0.5
DK	0.3 / 0.4	(0.3 / 0.4) ¹
NO	0.5/1T / 0.6/1.2T	–
FIN	0.3 / 0.37	1 / 1.2
SE	0.5 / 0.6	1 / 1.2 ²
Lowest value (NIOSH)	0.016 / –	0.1 / – ³

Concentration	Acute health effects	Detection Devices	Protection Devices
0.5 – 1 ppm	Eye irritation	Tubes, CMS, portable gas detectors	Half mask, fullface mask, gas-tight CPS
1 ppm	Threshold concentration for irritation to the nose/throat area	Tubes, CMS, portable gas detectors	Half mask, fullface mask, gas-tight CPS
4 – 5 ppm	Lacrimation and distinct irritation to the nose and throat	Tubes, CMS, portable gas detectors	Half mask, fullface mask; gas-tight CPS
10 – 20 ppm	Burning sensation in the eyes, nose and throat, severe lacrimation, severe difficulty in breathing, severe cough. 20ppm was set as LDLH value (immediately dangerous to life or health)	Tubes, portable gas detectors	Fullface mask, PAPR, gas-tight CPS
50 – 100 ppm	Constriction in the chest, headache, palpitations; in extreme cases death can result due to suffocation as a consequence of swelling or spasms of the larynx. Exposures for 5 – 10 minutes can even damage the lung.	Tubes, CMS, portable gas detectors; stationary gas detection	Half mask, fullface mask, gas-tight CPS

Hydrazine

Formula	N ₂ H ₄
CAS No.	302-01-2 (anhydrous)
Synonyms	Diamine Hydrazine (anhydrous) Hydrazine base
State of Aggregation	At 1,013 mbar / 20 °C: liquid (oily, colorless fluid)
LEL	4.7 vol. % / 60 g/m ³
UEL	100 vol. %
Flash point	40 °C
Ignition point	270 °C


GHS symbols



Limit values	TWA	STEL
	ppm / mg/m ³	ppm / mg/m ³
UK	0.02 / 0.03	0.1 / 0.13
NL	–	–
DK	0.01 / (0.013) ¹	(0.02 / 0.026) ¹
NO	0.01 / 0.01	–
FIN	0.1 / 0.13	0.3 / 0.4
SE	–	–
Lowest value (NIOSH)	–	0.03 / 0.04 ⁴


Concentration	Acute health effects	Detection Devices	Protection Devices
< 50 ppm	Irritative through to corrosive effects to the mucous membranes and skin, lung damage, sensitizing effects to the skin, disturbances to the CNS, damage to the liver and kidney	Tubes, portable gas detectors, stationary gas detection	Half masks, fullface masks, PAPR, splash suits, gas-tight CPS
50 ppm	IDLH (immediately dangerous to life or health) value	Portable gas detectors	Splash suits, gas-tight CPS

Hydrogen

Formula	H ₂	
CAS No.	1333-74-0	
Synonyms	–	
State of Aggregation	At 1013 mbar / 20 °C: gaseous (colorless)	
LEL	4.0 vol. % / 3.4 g/m ³	
UEL	77 vol. % / 65 g/m ³	
Flash point	n.a.	
Ignition point	560 °C	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	–	–
NL	–	–
DK	–	–
NO	–	–
FIN	–	–
SE	–	–
Lowest value (EU)	–	–


Concentration	Acute health effects	Detection Devices	Protection Devices
Generally	Hydrogen is an odorless gas and in its pure grade form non-toxic. It does not irritate the eyes, airways and skin even at high concentrations. However, in high concentrations it has a suffocating impact due to displacement of oxygen	Tubes, portable gas detectors, stationary gas detection	–
Hydrogen displacing oxygen (O ₂)	The following symptoms which also include depressive effects to the CNS are considered to be typical at decreasing oxygen content of the air breathed in: increased respiratory frequency and pulse as well as slight disturbance of the muscle coordination (at 16 – 12 % O ₂), emotional upset, abnormal fatigue/sleepiness and respiratory disturbances (at 14 – 10 % O ₂) nausea, vomiting, collapse and unconsciousness (at 10 – 6 % O ₂). Concentrations below 7 % O ₂ lead to death by asphyxiation after strong difficulty in breathing, cramps and respiratory depression.	–	–
High concentration	A high (squeaky) sound of the voice was considered to be a typical sign of a high concentration of hydrogen.	–	–
No health data per level of concentration	–	–	–

Hydrogen Chloride

Formula	HCl	
CAS No.	7647-01-0	
Synonyms	Chlorohydric acid Hydrochloric acid anhydrous	
State of Aggregation	At 1,013 mbar / 20 °C: liquid (colorless)	
LEL	n.a.	
UEL	n.a.	
Flash point	n.a.	
Ignition point	n.a.	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	1 / 2	5 / 8
NL	- / 8	- / 15
DK	5 / 8	-
NO	5 / 7	-
FIN	-	-
SE	-	5 / 8 ²
Lowest value (NIOSH)	-	5 / 7 ²

Concentration	Acute health effects	Detection Devices	Protection Devices
Generally	Irritative effect up to chemical burn to the eyes, respiratory tract and skin (concentration > 10% cause corrosion of 1st to 3rd degree). Danger of severe damage of eye and lungs. At ingestion damage to the digestive tract.	Tubes	Half masks, fullface masks, PAPR, splash suits, gas-tight CPS
No health data per level of concentration	-	-	-

Hydrogen Cyanide

Formula	HCN	
CAS No.	74-90-8	
Synonyms	Hydrocyanic acid Formonitrile Prussic acid	
State of Aggregation	At 1,013 mbar / 20 °C: liquid (colorless) At 1,013 mbar above 26 °C: gaseous (colorless)	
LEL	5.5 vol. % / 60 g/m ³	
UEL	46.6 vol. % / 520 g/m ³	
Flash point	-20 °C	
Ignition point	535 °C	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	-	10 / 11
NL	- / 1	-
DK	5 / 5	(10 / 10) ¹
NO	5 / 5	-
FIN	-	10 / 11
SE	-	(5 / -) ¹
Lowest value (NIOSH)	-	4.7 / 5 ³

Concentration	Acute health effects	Detection Devices	Protection Devices
0.2 – 5.1 ppm	Odor threshold value (characteristic odor of bitter almond) (However, many people are unable to perceive the odor of HCN even at high concentrations.)	Tubes, CMS; portables gas detectors	Half masks, fullface masks, PAPR, gas-tight CPS
50 – 270 ppm	Inhalative poisoning: the following concentrations are considered to be lethal: 270 ppm: immediately; 181 ppm: 10 min; 135 ppm: 30 min; 108 – 135 ppm: 0.5 – 1 h; ca. 50 ppm is considered to be tolerable for a short time	-	Fullface masks, gas-tight CPS
10,000 ppm	2 – 5 minutes in an atmosphere containing 10,000 ppm for volunteers with respiratory protection caused only reddening of the eyes.	-	Gas-tight CPS
About 53,000 ppm	Significantly high concentrations caused severe tingling to the exposed, uncovered arm of a volunteer after 22 minutes.	-	Gas-tight CPS

Hydrogen Fluoride

Formula	HF	
CAS No.	7664-39-3	
Synonyms	Anhydrous hydrofluoric acid Fluorhydric acid Hydrofluoric acid anhydrous AHF	
State of Aggregation	At 1,013 mbar / 20 °C: gaseous (colorless)	
LEL	n.a.	
UEL	n.a.	
Flash point	n.a.	
Ignition point	n.a.	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	1.8 / 1.5	(3 / 2.5) ¹
NL	–	– / 1
DK	1.8 / 1.5	3.6 / 3
NO	– / 0.5	–
FIN	1.8 / 1.5	3 / 2.5
SE	–	2 / 1.7 ²
Lowest value (EU)	1.8 / 1.5	3 / 2.5

Concentration	Acute health effects	Detection Devices	Protection Devices
2.5 – 5.2 mg/m ³ (3 – 6.2 ppm)	Inhalation for 1 hour: irritation to the upper respiratory tract (nose and throat); lacrimation. HF on skin causes corrosion, at least burning sensations.	Tubes, portable gas detectors, stationary gas detection	Half masks, fullface masks, gas-tight CPS
80 % aqueous HF solution	Contamination of approximately 5 % of the skin surface also caused pain in the chest, dyspnoe and serious metabolic disturbances (hypocalcemia) resulting in death.	–	Gas-tight CPS
25 mg/m ³ ; 50 mg/m ³	Concentrations of 25 mg/m ³ could only be tolerated by volunteers for short time periods, 50 mg/m ³ produced immediate irritation to the conjunctiva and mucous membranes of the nose and throat.	–	Gas-tight CPS
25 mg/m ³ (30 ppm)	IDLH (immediately dangerous to life or health) value	–	Gas-tight CPS
42 mg/m ³ (50 ppm)	It is assumed that exposure for 30 – 60 minutes can cause death.	–	Gas-tight CPS
unquantified Vapours or aerosols of HF	Accidents with vapours or aerosols led to serious lung damage (hemorrhagic pulmonary edema, atelectasis and bleeding in the airways). Death mostly occurred very rapidly (30 – 150 min after exposure).	–	Gas-tight CPS

Hydrogen Peroxide Solution

Formula	H ₂ O ₂
CAS No.	7722-84-1
Synonyms	Hydrogen superoxide solution
State of Aggregation	At 1,013 mbar / 20 °C: liquid (colorless)
LEL	n.a.
UEL	n.a.
Flash point	n.a.
Ignition point	n.a.


GHS symbols



Limit values	TWA	STEL
	ppm / mg/m ³	ppm / mg/m ³
UK	1 / 1.4	2 / 2.8
NL	–	–
DK	1 / 1.4	(2 / 2.8) ¹
NO	1 / 1.4	–
FIN	1 / 1.4	3 / 4.2
SE	1 / 1.4	2 / 3 ²
Lowest value (NIOSH)	1	1.4


Concentration	Acute health effects	Detection Devices	Protection Devices
7 ppm	Irritation threshold of effects on the human mucosa of the respiratory tract	Portable gas detectors	Fullface masks, splash suits, gas-tight CPS
14 ppm	Irritation threshold of effects on the human skin	Portable gas detectors	Fullface masks, splash suits, gas-tight CPS
75 ppm	IDLH-Wert (immediately dangerous to life or health)	–	Fullface masks, splash suits, gas-tight CPS

Hydrogen Phosphide

Formula	H ₃ P
CAS No.	7803-51-2
Synonyms	Phosphine Phosphoretted hydrogen Phosphorus trihydride
State of Aggregation	At 1,013 mbar / 20 °C: gaseous (colorless)
LEL	1.6 vol. %
UEL	100 vol. % Experimental determination of the upper explosion limit is not possible.
Flash point	n.a.
Ignition point	100 °C
GHS symbols	
Limit values	TWA STEL
	ppm / mg/m³ ppm / mg/m³
UK	0.1 / 0.14 0.2 / 0.28
NL	- / 0.14 -
DK	0.1 / 0.14 (0.2 / 0.3) ¹
NO	0.1 / 0.15 -
FIN	0.1 / 0.14 0.2 / 0.28
SE	0.3 / 0.4 1 / 1.4
Lowest value (EU)	0.1 / 0.14 0.2 / 0.28


Concentration	Acute health effects	Detection Devices	Protection Devices
Generally	Hydrogen phosphide reacts strongly systemically toxic and damages the lung. The danger is increased because of the insufficiency or absence of a warning action through odor or irritation. It is odorless up to concentrations of 280 mg/m ³ . The odor of the technical grade Hydrogen phosphide is sometimes similar to garlic or carbide, sometimes like fish at 0.14 – 7 mg/m ³ .	Tubes, CMS, portable gas detectors, stationary gas detection	Half masks, fullface masks, PAPR, gas-tight CPS
0.5 – 30 ppm	The subacute poisoning picture is described in a case report in which about 30 persons were exposed to 0.5 – 30 ppm for several days. Symptoms (following at least 2 days) were: vertigo (86 %), nausea (72 %), headache (66 %), vomiting, shortness of breath and paraesthesia (59 %), jaundice (52 %), tremor (31 %), ataxia and double vision. All of the adults survived, a 2 year old child died (findings of the section: respiratory oedema, damage to the heart and blood vessels).	Tubes, CMS, portable gas detectors	Fullface masks, gas-tight CPS
50 ppm (70 mg/m ³)	IDLH value (immediately dangerous to life or health)	Tubes, CMS, portable gas detectors	Gas-tight CPS
290 ppm (400 mg/m ³)	Concentrations of 290 ppm (400 mg/m ³) for 0.5 – 1 hour are estimated to be life threatening or lethal.	Tubes, CMS, portable gas detectors	Gas-tight CPS
1,000 ppm	Concentrations of 1,000 ppm for 5 minutes are lethal.	Tubes, CMS, portable gas detectors	Gas-tight CPS

Hydrogen Sulfide

Formula	H ₂ S	
CAS No.	7783-06-4	
Synonyms	Hydrogen sulphide Sulphuretted hydrogen Hydrogen sulfuric acid Sulfur hydride	
State of Aggregation	At 1,013 mbar / 20 °C: gaseous (colorless)	
LEL	4.3 vol. % / 60 g/m ³	
UEL	45.5 vol. % / 650 g/m ³	
Flash point	n.a.	
Ignition point	270 °C	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	5 / 7	10 / 14
NL	- / 2.3	-
DK	5 / 7	(20 / 30) ¹
NO	5 / 7	-
FIN	5 / 7	10 / 14
SE	10 / 14	15 / 20 ²
Lowest value (EU)	5 / 7	10 / 14 ⁵


Concentration	Acute health effects	Detection Devices	Protection Devices
0.02 – 10 ppm	Unpleasant smell and irritation to the eyes	Tubes, CMS, portable gas detectors; stationary gas detection	Half mask, fullface mask; gas-tight CPS
5 – 10 ppm	Respiratory problems may appear for asthmatics. Healthy volunteers experienced no irritation.	Tubes, CMS, portable gas detectors; stationary gas detection	Half mask, fullface mask, PAPR; gas-tight CPS
10 ppm	Threshold for eye irritation	Tubes, CMS, portable gas detectors; stationary gas detection	Half mask, fullface mask, PAPR; gas-tight CPS
20 – 30 ppm	The smell of H ₂ S is repellent	Tubes, CMS, portable gas detectors; stationary gas detection	Half mask, fullface mask, PAPR; gas-tight CPS
> 100 ppm	Failure of olfactory warning as a result of paralysis of the sense of smell leads to high risk of intoxication; irritation to the eyes (lacrimation, reddening, sensitization to light) and the nose and throat membranes.	Tubes, CMS, portable gas detectors; stationary gas detection	Half mask, fullface mask, PAPR; gas-tight CPS
> 150 ppm	30 minutes: headache, dizziness, diarrhea	Tubes, CMS, portable gas detectors	Half mask, fullface mask, PAPR; gas-tight CPS
300 – 500 ppm	Danger of lung damage, in addition severe systemic effects (possible symptoms: headache, dizziness, ataxia, shortness of breath, stimulation of breathing, tachycardia, reduced blood pressure, unconsciousness)	Tubes, CMS, portable gas detectors	Fullface Mask, PAPR; gas-tight CPS
500 ppm	Rapid life-threatening effects on the CNS and heart; lethal after inhalation for longer than approx. 30 minutes	Tubes, CMS, portable gas detectors	Fullface Mask, PAPR; gas-tight CPS
> 1,000 ppm	Immediate collapse and respiratory paralysis	Tubes, CMS, port. gas detec.	Fullface Mask, gas-tight CPS

Methane

Formula	CH ₄	
CAS No.	74-82-8	
Synonyms	Methan R 50	
State of Aggregation	At 1,013 mbar / 20 °C: gaseous (colorless)	
LEL	4.4 vol. % / 29 g/m ³	
UEL	17 vol. % / 113 g/m ³	
Flash point	n.a.	
Ignition point	595 °C	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	-	-
NL	-	-
DK	-	-
NO	-	-
FIN	-	-
SE	-	-
Lowest EU value	-	-


Concentration	Acute health effects	Detection Devices	Protection Devices
Generally	Methane as a gas is non-toxic regarding effects on the CNS, and even in high concentrations causes neither irritations on the skin, nor on the eyes. Contact with liquified or supercooled methane results in local frostbite on the skin, or in serious and sometimes irreversible eye damage. The main effect of methane in high concentrations is, however, a suffocating impact due to displacement of oxygen. For the effects of reducing oxygen see remarks at "hydrogen".	Tubes, portable gas detectors, stationary gas detection	Gas-tight CPS
140,000 ppm (14 %)	Reduction of oxygen in the breathing air to 18 %. Higher concentrations reduce the oxygen partial pressure in the breathing air with the effect of hypoxia.	-	Gas-tight CPS
> 300,000 ppm (30 %)	It is estimated that effects on the CNS (anesthesia) will occur only at high concentrations of 300,000 ppm upwards.	-	Gas-tight CPS

Methanol

Formula	CH ₄ O	
CAS No.	67-56-1	
Synonyms	Carbinol, Colonial spirits, Methyl alcohol, Monohydroxymethane, Pyroxylic spirit, Pyroligneous spirit, Standard wood spirits, Wood alcohol, Wood naphtha	
State of Aggregation	At 1,013 mbar / 20 °C: liquid (colorless)	
LEL	6 vol. % / 80 g/m ³	
UEL	50 vol. % / 665 g/m ³	
Flash point	9 °C	
Ignition point	440 °C	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	200 / 266	250 / 333
NL	- / 133	-
DK	200 / 260	(400 / 520) ¹
NO	100 / 130	-
FIN	200 / 270	250 / 330
SE	200 / 250	250 / 350
Lowest value (EU)	200 / 260	-


Concentration	Acute health effects	Detection Devices	Protection Devices
7,600 ppm and 65,400 ppm	7,600 ppm for 5 minutes led to only weak, however, 65,400 ppm to very severe irritation to the nasal mucous membranes	-	Half masks, fullface masks, splash suits, gas-tight CPS
> 50,000 ppm	Rats and mice: Exposures of concentrations at the level of > 50,000 ppm for about 4 hours resulted in general anesthesia, coma and death in some cases. However, no details were referred.	-	Fullface masks, splash suits, gas-tight CPS

Methylamine Anhydrous

Formula	CH ₅ N	
CAS No.	74-89-5	
Synonyms	Aminomethane, anhydrous Methanamine Monomethylamine	
State of Aggregation	At 1,013 mbar / 20 °C: gaseous (colorless)	
LEL	4.9 vol. % / 60 g/m ³	
UEL	20.7 vol. % / 270 g/m ³	
Flash point	-57.78 °C 40 % aqueous solution: -18 °C	
Ignition point	430 °C	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	(10 / 13) ¹	-
NL	-	-
DK	5 / 6.4	(10 / 12.8) ¹
NO	10 / 12	-
FIN	-	10 / 13
SE	10 / 13	20 / 25
Lowest value (NIOSH)	10 / 12	-


Concentration	Acute health effects	Detection Devices	Protection Devices
8 ppm – 11 ppm	Odor threshold	Tubes, portable gas detectors	Half masks, fullface masks, PAPR
10 – 20 ppm	Irritation to the mucous membranes in the upper airways	Tubes, portable gas detectors	Half masks, fullface masks, PAPR
20 – 100 ppm	Irritation to the nose, eyes and throat	Portable gas detectors	Half masks, fullface masks, PAPR
141 ppm	Mice: an RD50 value of 141 ppm was found (concentration at which the respiratory frequency is decreased to 50 % within a 15 minutes exposure period)	Portable gas detectors	Half masks, fullface masks, PAPR
448 ppm	Rats: complex of symptoms was registered, dominated by irritation. In comparison, effects to the nervous system (restlessness, apathy, convulsions) were only minor. The most frequent cause of death was broncho-pneumonia which developed after 1 – 2 days.	Portable gas detectors	Fullface masks, PAPR

Naphthalene

Formula	C ₁₀ H ₈	
CAS No.	91-20-3	
Synonyms	Naphthalin Tar camphor White tar	
State of Aggregation	At 1,013 mbar / 20 °C: solid (white flakes, powder, pellets or balls)	
LEL	0.9 vol. % / 48 g/m ³	
UEL	5.9 vol. % / 315 g/m ³	
Flash point	80 °C	
Ignition point	540 °C	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	10 / 53	(15 / 80) ¹
NL	- / 50	- / 80
DK	10 / 50	(20 / 100) ¹
NO	10 / 50	-
FIN	1 / 5	2 / 10
SE	10 / 50	15 / 80
Lowest value (EU)	10 / 50	-

Concentration	Acute health effects	Detection Devices	Protection Devices
Generally	Slight irritation to the mucous membranes and skin, disturbances to the CNS, damage to the blood (hemolysis). At oral intake: nausea, emesis, cramps and diarrhoea, disturbance of consciousness, lethargy and ataxia.	-	-
> 15 ppm	Irritation to the eyes can appear.	Portable gas detectors	Fullface masks, PAPR, splash suits, gas-tight CPS
250 ppm	Based on the oral toxicity data an IDLH value (immediately dangerous to life or health) of 250 ppm was derived for inhalative exposure	Portable gas detectors	Splash suits, gas-tight CPS

Nitrogen Monoxide

Formula	NO	
CAS No.	10102-43-9	
Synonyms	Nitric oxide Mononitrogen monoxide	
State of Aggregation	At 1,013 mbar / 20 °C: gaseous (colorless)	
LEL	n.a.	
UEL	n.a.	
Flash point	n.a.	
Ignition point	n.a.	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	(25 / 31) ¹	(35 / 44) ¹
NL	- / 0.25	-
DK	25 / 30	(50 / 60) ¹
NO	25 / 29	-
FIN	25 / 31	-
SE	25 / 30	50 / 60
Lowest value (NIOSH)	20 / 30	-


Concentration	Acute health effects	Detection Devices	Protection Devices
Generally	In comparison to NO ₂ the toxicity of NO is relatively low. The symptoms described below mainly result from a pollution with NO ₂ .	Tubes, portable gas detectors, stationary gas detection	Fullface masks, gas-tight CPS
15 ppm	Exposition for 15 min: significant alterations of the arterial oxygen content and the pulmonary function.	Tubes, portable gas detectors, stationary gas detection	Fullface masks, gas-tight CPS
> 15 ppm	Respiratory distress, cyanosis, vomiting, vertigo, unconsciousness	Tubes, portable gas detectors, stationary gas detection	Fullface masks, gas-tight CPS
2,500 ppm	Mice: following exposition of 6 – 7 min. anesthesia and death after 12 min	Tubes	Gas-tight CPS

Nitrogen Dioxide

Formula	NO ₂	
CAS No.	10102-44-0	
Synonyms	Nitrogen peroxide Dinitrogen tetroxide Nitrogen tetroxide Liquid dioxide Nitrogen oxide	
State of Aggregation	At 1,013 mbar / 20 °C: gaseous (brownish)	
LEL	n.a.	
UEL	n.a.	
Flash point	n.a.	
Ignition point	n.a.	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	(3 / 5.7) ¹	(5 / 9.6) ¹
NL	- / 0.4	-
DK	2 / 4	(2 / 4) ¹
NO	0.6 / 1.1	-
FIN	3 / 5.7	6 / 11
SE	(2 / 4) ¹	(5 / 10) ¹
Lowest value (EU)	0.2	-


Concentration	Acute health effects	Detection Devices	Protection Devices
0.04 – 5 ppm	Strong differences in the subjective olfactory cognition (sweet-and-sour, bitter). Nevertheless, sufficient warning effect.	Tubes, CMS, portable gas detector, stationary gas detection	Fullface masks, gas-tight CPS
1.5 ppm	A study with volunteers caused after a short time exposition (3 hours) an increase of the respiratory tract reactivity in healthy persons.	Tubes, CMS, portable gas detector, stationary gas detection	Fullface masks, gas-tight CPS
1 – 13 ppm	Concentrations of 1 – 13 ppm cause irritations of the mucosae of the respiratory tract.	Tubes, CMS, portable gas detector, stationary gas detection	Fullface masks, gas-tight CPS
10 – 70 ppm	Concentrations about 10 ppm irritate the mucosae of eyes. Rabbits: Concentrations of about 70 ppm for 8 hours cause persistent opacity of the cornea.	Tubes, portable gas detector, stationary gas detection	Fullface masks, gas-tight CPS
25 ppm	60 min-exposition: irritation of the respiratory tract and chest pains	Tubes, portable gas detector, stationary gas detection	Fullface masks, gas-tight CPS
50 ppm	60 min-exposition: pulmonary oedema, potentially a subacute or chronic damage of the lung.	Tubes, portable gas detector, stationary gas detection	Fullface masks, gas-tight CPS
100 ppm	60 min-exposition: pulmonary oedema and death.	Tubes	Fullface masks, gas-tight CPS

Octane

Formula	C ₈ H ₁₈	
CAS No.	111-65-9	
Synonyms	n-octane	
State of Aggregation	At 1,013 mbar / 20 °C: liquid (colorless)	
LEL	0.8 vol. % / 38 g/m ³	
UEL	6.5 vol. % / 310 g/m ³	
Flash point	12 °C	
Ignition point	205 °C	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	(210 / 1,200) ¹	–
NL	–	–
DK	200 / 935	(400 / 1,870) ¹
NO	150 / 725	–
FIN	300 / 1,400	380 / 1,800
SE	(200 / 900) ¹	(300 / 1,400) ¹
Lowest value (NIOSH)	75 / 350	385 / 1,800 ³

Concentration	Acute health effects	Detection Devices	Protection Devices
153 – 255 ppm	Threshold of the gasoline-like odor	Tubes, CMS, portable gas detectors	Half masks, fullface masks, PAPR, gas-tight CPS
306 ppm	Threshold to cause irritation on the mucosae of the eyes and the upper respiratory tract	Tubes, CMS, portable gas detectors	Half masks, fullface masks, PAPR, gas-tight CPS
From 4,000 ppm upwards	Inhalative test on mice: concentrations from 4,000 ppm upwards for 30 minutes led to a statistically significant, reversible increase in motor activity and changes to typical behavior.	Tubes	Half masks, fullface masks, gas-tight CPS
7,000 ppm	Inhalative test on mice: a threshold concentration for narcotic effects was found to be 7,000 ppm for 30 minutes.	Tubes	Gas-tight CPS

Ozone

Formula	O ₃	
CAS No.	10028-15-6	
Synonyms	Triatomic oxygen	
State of Aggregation	At 1,013 mbar / 20 °C: gaseous (bluish)	
LEL	n.a.	
UEL	n.a.	
Flash point	n.a.	
Ignition point	n.a.	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	–	0.2 / 0.4
NL	– / 0.12	–
DK	0.1 / 0.2	(0.1 / 0.2) ¹
NO	0.1 / 0.2	–
FIN	0.05 / 0.1	0.2 / 0.4
SE	0.1 / 0.2	0.3 / 0.6
Lowest value (NIOSH)	–	0.1 / 0.2 ²

Concentration	Acute health effects	Detection Devices	Protection Devices
0.2 – 0.4 mg/m ³	Irritation of the mucosae of the eyes and the respiratory tract (with asthma patients), restriction of the lung capacity, odor nuisance	Tubes, CMS, portable gas detectors	Half masks, fullface masks, PAPR
0.8 – 1 mg/m ³	Inflammatory cells in nose and lung liquids	Tubes, CMS, portable gas detectors	Half masks, fullface masks, PAPR
2 – 10 mg/m ³	Short-time exposition: irritation of the conjunctiva, the mucosa of the upper respiratory tract and the alveolar epithelium. Furthermore nausea, headache, fatigue and vertigo	Tubes, CMS, portable gas detectors (only 2–3mg/m ³ > 3 mg/m ³ no information in VOICE)	Half masks, fullface masks, PAPR (only 2–3mg/m ³ > 3 mg/m ³ no information in VOICE)
100 mg/m ³	Exposition time of 30 minutes: lethal	–	–

Propane

Formula	C ₃ H ₈
CAS No.	74-98-6
Synonyms	Dimethyl methane n-Propane Propyl hydride
State of Aggregation	At 1,013 mbar / 20 °C: gaseous (colorless)
LEL	1.7 vol. % / 31 g/m ³
UEL	10.8 vol. % / 202 g/m ³
Flash point	-104 °C
Ignition point	470 °C


GHS symbols



Limit values	TWA	STEL
	ppm / mg/m ³	ppm / mg/m ³
UK	-	-
NL	-	-
DK	1,000 / 1,800	(2,000 / 3,600) ¹
NO	500 / 900	-
FIN	800 / 1,500	1,100 / 2,000
SE	-	-
Lowest value (NIOSH)	1,000 / 1,800	-


Concentration	Acute health effects	Detection Devices	Protection Devices
5,000 – 20,000 ppm	Odor threshold, slight irritation only appears at much higher concentrations	CMS	Gas-tight CPS
10,000 ppm	In inhalation studies it was found that short-term exposure to even 10,000 ppm did not cause any or only a slightly dazed feeling.	-	Gas-tight CPS
> 100,000 ppm	Accelerated respiration, difficulties in breathing, disturbances to coordination, decreased alertness, emotional instability, rapid fatigue, nausea, vomiting, weakness, unconsciousness, cramps and deep coma	-	Gas-tight CPS

Sulfur

Formula	S1 (S8)	
CAS No.	7704-34-9	
Synonyms	Brimstone Sulphur	
State of Aggregation	At 1,013 mbar / 20 °C: solid (brittle crystals or powder)	
LEL	n.a.	
UEL	n.a.	
Flash point	160 °C	
Ignition point	235 °C	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	-	-
NL	-	-
DK	-	-
NO	-	-
FIN	-	-
SE	-	-
Lowest value (EU)	-	-


Concentration	Acute health effects	Detection Devices	Protection Devices
Generally	High concentrations of sulphur dust have caused functional disorder in the respiratory tract, tracheobronchitis, dyspnoea, lacrimation, conjunctivitis at workers in sulphur mines Oral poisoning from 15 g upwards causes toxic effects like nausea, vomiting, diarrhoea, headache, vertigo, CNS depression, or collapse. Low concentrations (< 1 g) only cause diarrhoea	-	Half masks, fullface masks, PAPR
No health data per level of concentration	-	-	-

Sulfur Dioxide

Formula	SO ₂	
CAS No.	7446-09-5	
Synonyms	Dioxide of sulphur Sulfurous anhydride Sulfurous oxide	
State of Aggregation	At 1,013 mbar / 20 °C: gaseous (colorless)	
LEL	-	
UEL	-	
Flash point	-	
Ignition point	-	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	(2 / 5.3) ¹	(5 / 13) ¹
NL	-	-
DK	0.5 / 1.3	(1 / 2.6) ¹
NO	0.8 / 2	-
FIN	1 / 2.7	4 / 11
SE	2 / 5	5 / 13 ²
Lowest value (NIOSH)	2 / 2	5 / 10 ³


Concentration	Acute health effects	Detection Devices	Protection Devices
> 0.5 ppm	Persons with unspecific hypersensitivity of the airways or asthmatics can already react to minor concentrations with the result of bronchoconstriction.	Tubes, CMS, Portables gas detectors	Half masks, fullface masks, gas-tight CPS
5 – 10 ppm	For unadapted persons, irritation to the upper airways and increased airway resistance (as a sign of bronchoconstriction) is noticeable; in isolated cases spasmodic cough can already result.	Tubes, CMS, Portables gas detectors	Half masks, fullface masks, gas-tight CPS
8 – 10 upwards	The gas irritates the mucous membranes of the eyes.	Tubes, CMS, Portables gas detectors	Half masks, fullface masks, gas-tight CPS
> 20 ppm	Irritating to the airways	Tubes, CMS, Portables gas detectors	Fullface masks, gas-tight CPS
> 50 ppm	Cause irritation to the nose and throat, cough, running nose, difficulties in breathing, substernal pain and lacrimation. Intensive irritation to the eyes.	Tubes, CMS, Portables gas detectors	Fullface masks, gas-tight CPS
> 100 ppm	Directly life threatening (IDLH value).	Tubes, CMS, Portables gas detectors	Fullface masks, gas-tight CPS

Toluene

Formula	C ₇ H ₈	
CAS No.	108-88-3	
Synonyms	Toluol Methylbenzene Methylbenzol Phenylmethane	
State of Aggregation	At 1,013 mbar / 20 °C: liquid (colorless)	
LEL	1.1 vol. % / 42 g/m ³	
UEL	7.8 vol. % / 300 g/m ³	
Flash point	6 °C	
Ignition point	535 °C	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	50 / 191	100 / 384
NL	- / 150	- / 384
DK	25 / 94	(50 / 188) ¹
NO	25 / 94	-
FIN	25 / 81	100 / 380
SE	50 / 200	100 / 400
Lowest value (EU)	50 / 192	100 / 384

Concentration	Acute health effects	Detection Devices	Protection Devices
About 100 ppm	Following inhalative exposure, irritation to the eyes and nose/throat become noticeable	Tubes, CMS, portable gas detectors	Half masks, fullface masks, PAPR, splash suits, gas-tight CPS
> 75 – 150 ppm	3 – 8 hours: disturbances to well-being (sleepiness, headache and vertigo) and slight deficiencies in performance tests	Tubes, CMS, portable gas detectors	Half masks, fullface masks, PAPR, splash suits, gas-tight CPS
> 200 ppm	Influences on reaction time were distinct	Tubes, CMS, portable gas detectors	Half masks, fullface masks, PAPR, splash suits, gas-tight CPS
> 300 ppm	Disturbances to complex brain functions	Tubes, CMS, portable gas detectors	Half masks, fullface masks, PAPR, splash suits, gas-tight CPS
400 ppm	Euphoria, confusion, sleepiness, headache, nausea	Tubes, portable gas detectors	Half masks, fullface masks, PAPR, splash suits, gas-tight CPS
500 ppm	IDLH value (immediately dangerous to life or health)	Tubes, portable gas detectors	Half masks, fullface masks, PAPR, splash suits, gas-tight CPS
400 – 1,600 ppm upwards	Irritation to the eyes and nose/throat become noticeable are distinct but remain relatively weak.	Tubes, portable gas detectors	Half masks, fullface masks, PAPR, splash suits, gas-tight CPS
600 – 1,800 ppm	disturbances to coordination and sight, at 800 ppm loss of self-control and persistent nervousness, sleeplessness, muscular weakness, prostration and also loss of memory which still persisted some days after exposure	Tubes, portable gas detectors	Half masks, fullface masks, PAPR, splash suits, gas-tight CPS
4,000 ppm	Cause loss of self-control within a few minutes	Tubes, portable gas detectors	Fullface masks

Xylene, Mixture of Isomeres

Formula	C ₈ H ₁₀	
CAS No.	1330-20-7	
Synonyms	–	
State of Aggregation	At 1,013 mbar / 20 °C: liquid (colorless)	
LEL	0.9 vol. % / 40 g/m ³	
UEL	7.8 vol. % / 340 g/m ³	
Flash point	25 °C	
Ignition point	465 °C	
GHS symbols		
Limit values	TWA	STEL
	ppm / mg/m³	ppm / mg/m³
UK	50 / 220	100 / 441
NL	– / 210	– / 442
DK	25 / 109	(50 / 218) ¹
NO	25 / 108	–
FIN	50 / 220	100 / 440
SE	50 / 200	100 / 450
Lowest value (EU)	50 / 221	100 / 442

Concentration	Acute health effects	Detection Devices	Protection Devices
100 – 200 ppm	In studies on volunteers carried out with m-xylene, in part also with xylene mixtures, disturbances to the CNS were registered at 100 – 200 ppm for 4 hours.	Tubes, CMS, portable gas detectors	Half masks, fullface masks, PAPR, splash suits, gas-tight CPS
200 – 500 ppm	Slight irritation to the eyes, nose and throat was sometimes observed at 200 ppm but mostly only at 500 ppm.	Tubes, portable gas detectors	Half masks, fullface masks, splash suits, gas-tight CPS
700 ppm	After inhalation of about 700 ppm xylene for more than 1 hour, the following poisoning symptoms were observed: headache, nausea, vomiting, dazed feeling, vertigo, irritation to the nose and throat.	Tubes, portable gas detectors	Half masks, fullface masks, PAPR, splash suits, gas-tight CPS
900 ppm	The IDLH value for xylenes was stated to be 900 ppm. When serious poisoning was survived, the following sequelae were reported: amnesia, changes to the EEG, disturbance to behavior, lung damage, functional disturbances to the liver and kidneys.	Tubes, portable gas detectors	Half masks, fullface masks, PAPR, splash suits, gas-tight CPS

Footnotes ¹ Limit value from GESTIS international limit value database, due to lack of local publication

² Ceiling value

³ Ceiling value (15 min.)

⁴ Ceiling value (120 min.)

⁵ Average value (15 min.)

Sources Data on health effects based on the GESTIS-Database from the Institute for Occupational Safety and Health of the German Social Accident Insurance (IFA). Data retrieved January 26th, 2012. Used by permission. Information on Detection and Protection Devices based on VOICE-Database. Data retrieved January 31st, 2012.

Physical and chemical properties as well as limit values of the substances are retrieved from local country databases. When local databases didn't contain necessary data, GESTIS-Database was used. Data retrieved January 26th, 2012.

Local Databases

FIN:

HTP-arvot 2009. Haitallisiksi tunnetut pitoisuudet. Sosiaali- ja terveysministeriön julkaisuja 2009:11

UK:

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

NL:

GESTIS International limit values (2011)

NO:

Direktoratet for Arbeidstilsynet, Dez. 2011

SE:

Statute Book of the Swedish Work Environment Authority, AFS 2005:17.
TWA-(STV) STEL-(LLV) Ceiling-(CLV)

DK:

Grænseværdier for stoffer og materialer
Arbejdstilsynet, may, 2011.

GHS symbols are retrieved from United Nations Economic Commission for Europe (UNECE). January 26th, 2012.

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