

2.5 Toxic gases and vapors

The toxicity of gases and vapors used in industrial processes is defined in laboratory experiments by determining the LC₅₀ rate. On that basis, and together with other scientific tests and experiments relating to occupational health at the workplace, authorized commissions in several countries make recommendations of limit values, which are legally binding. In Germany, this is the Federal Institute for Occupational safety and Health (BAuA).

This maximum allowable concentration in the air means that workers will not suffer any detrimental affects to their health if they spend their entire working lives breathing in gas concentrations, which do not exceed that level. This, however, must be assured.

Limit value	Selected substances to which this limit value applies
5,000 ppm	carbon dioxide
1,000 ppm	propane, butane
500 ppm	acetone
200 ppm	methyl ethyl ketone (MEK)
100 ppm	butanol
50 ppm	n-hexane, toluene
20 ppm	acetonitrile
10 ppm	chlorobenzene
5 ppm	diethylamine
1 ppm	1.1.2.2-tetrachloroethane
500 ppb	chlorine
200 ppb	methyl chlorformate
100 ppb	chlorine dioxide
50 ppb	glutaraldehyde
10 ppb	methyl isocyanate

Status 2010, according to TRGS 900 (Germany)

T+ Very toxic LC₅₀ < 0.5 g/m³

Arsine, boron trichloride, boron trifluoride, bromine, diborane, fluorine, hydrogen cyanide, hydrogen fluoride, hydrogen phosphide, hydrogen sulfide, nitrogen dioxide, nitrogen monoxide, ozone, phosgene, sulfur tetrafluoride, tungsten hexafluoride

T Toxic LC₅₀ = 0.5 ... 2.0 g/m³

Acetonitrile, ammonia, benzene, carbon disulfide, carbon monoxide, chlorine, cyanogen, hydrogen chloride, methanol, methyl bromide, nitrogen trifluoride, sulfur dioxide

LC₅₀ (LC stands for "lethal concentration") is the gas concentration in air, which – when inhaled over a given time period (usually four hours) – kills 50% of experimental animals (normally white laboratory rats).