



VOC

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VOC - Volatile Organic Compounds

Volatile Organic Compounds (VOC in short) is the collective term for organic, i.e. carbon-containing substances, which change into the gas phase at room temperature or higher temperatures through evaporation.

The gas methane, CH₄, is often not included, sometimes explicitly excluded with the abbreviation NMVOC (non-methane volatile organic compounds). The total emission concentration (total volatile organic compounds, TVOC in short) is the basis for the EMICODE classification, for example.

Definition

The word “volatile” implies that the substances belonging to the VOC group evaporate (volatilize) quickly due to their high vapor pressure or low boiling point. According to the World Health Organization (WHO), volatile organic compounds are classified according to their boiling point or the resulting volatility:

Description	Boiling range
1. Very Volatile Organic Compound (VVOC)	< 0 to 50...100 °C
2. Volatile Organic Compound (VOC)	50...100 to 240...260 °C
3. Semi-Volatile Organic Compounds (SVOC)	240...260 to 380...400 °C
4. Organic compound associated with particulate matter or particulate organic matter (POM)	380 °C

Table 1: Classification of VOCs

However, there is no uniform definition of what a VOC actually is (see Table 2).

Some definitions actually contain information on the vapor pressure, others, usually newer definitions, define VOCs via their photochemical reactivity as so-called precursor substances for the formation of ground-level ozone. In addition, certain organic substances are explicitly excluded from the VOC definition in some definitions.

Another definition is customary for the assessment of indoor air. This also applies to the emission of VOCs from products into indoor air.

Accordingly, information on the emission of VOCs can actually only be evaluated if the definition used is also given in addition to the information.



Country	Definition	Source
	All organic compounds (substances primarily composed of carbon and hydrogen) with boiling points in the range of 50 to 260 °C, with the exception of pesticides	World Health Organisation (WHO). cited after: Total Volatile Organic Compounds fact sheet (NPI, Australia)
Australia	Any chemical compound composed of carbon rings or chains (and containing hydrogen) with a vapor pressure greater than 2 mm Hg (0.27 kPa) at 25 °C, excluding methane. These compounds can also contain oxygen, nitrogen and other elements. Carbon dioxide, carbon monoxide, carbonic acid, carbonates, metal carbides and methane are explicitly excluded	NPI definition for Volatile Organic Compounds
Switzerland	Organic compounds with a vapor pressure of at least 0.1 mbar at 20 °C or with a boiling point of not more than 240 °C at 1013.25 mbar	Ordinance on the incentive tax on volatile organic compounds (VOCV) of November 12, 1997 (as of October 8, 2002)
Europe, Germany	An organic compound having a vapor pressure of 0.01 kilopascals or greater at 293.15 Kelvin, or an equivalent volatility under the conditions of use	Directive 1999/13/EC ... of March 11, 1999 on the limitation of emissions of volatile organic compounds
Europe	Any organic compound resulting from human activity, except methane, which can produce photochemical oxidants by reacting with nitrogen oxides in the presence of sunlight	Directive 2001/81/EC ... on national emission ceilings for certain air pollutants (23 October 2001)
Europe	Organic compound with an initial boiling point not exceeding 250 °C at a standard pressure of 101.3 kPa	Directive 2004/42/EC ... of April 21, 2004 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes
Europe	Organic compounds of anthropogenic or biogenic origin, other than methane, capable of generating photochemical oxidants by reacting with nitrogen oxides in the presence of sunlight	Directive 2008/50/EC ... of May 21, 2008 on ambient air quality and clean air for Europe
Europe	Carbon-based chemical compounds released into the air by natural sources or by human activities (e.g. use of solvents, paints and varnishes, storage of fuels and their use at service stations, vehicle exhaust fumes).	Thematic strategy on air pollution control (status: 1 December 2005)
USA	Any carbon-based chemical compound, other than carbon monoxide, carbon dioxide, carbonic acid, metal carbides or carbonates, and ammonium carbonate, involved in photochemical reactions in the atmosphere	Code of Federal Regulation (CFR) 40, Part 51.100(s), US EPA
ISO, VDI	Any organic chemical compound that can be measured as follows: adsorption from air on Tenax TA, thermal desorption, gas chromatographic separation over a 100% non-polar column (dimethylpolysiloxanes). VOC (volatile organic compounds) are all substances that occur in the gas chromatogram between and including n-hexane and n-hexadecane. Substances occurring earlier are classified as VVOC (very volatile organic compounds) and substances occurring later are classified as SVOC (semi-volatile organic compounds).	DIN EN ISO 16000-6, DIN EN ISO 13999-2, VDI 4300-6, AgBB evaluation scheme, DIBt approval principles, GEV test method for the EMICODE

Table 2: Definitions of VOCs

Health Effects

Exposure to volatile organic compounds in indoor air can cause people to develop certain symptoms. Those most commonly affected are people who are particularly sensitive to volatile chemicals, for example due to a specific illness. The symptoms such as headaches, hypersensitivity reactions, fatigue, reduced performance, sleep disorders and irritation of the respiratory tract are summarized under the term "sick building syndrome". The clinical picture is not internationally binding defined by the WHO. There is no generally recognized description of the clinical picture, so there is no ICD-10 code. Effects on the nervous system are also known.

GROHE

Most GROHE products do not contain any VOCs or volatile organic compounds with the following exceptions:

GROHE Produkt	Product no.	VOC		Comment
		Name	Content	
GROHE Blue	All product numbers	Isobutane (R600a) (coolant in through-flow cooler)	35 g / < 1 %	SWITZERLAND Exempted from: Ordinance on the incentive tax on volatile organic compounds (VOCV) of November 12, 1997 (as of October 8, 2002) (VOC content lower than 3%)
GROHE Fresh 2 in 1	38882000	Hydrocarbons, terpene (perfumes)	< 1 %	
GROHE touch-up pen (10 ml)	46076L00	n-Butyl acetate: 25 - 50 % 2-Methoxy-1- Methylethyl acetate: 5 - 10 % Reaction mass of ethylbenzene and xylene: < 10 % Ethanol: 2.5 - 5 % Naphtha (petroleum), hydrodesulfurized, heavy (content of benzene < 0.1 %): < 0.5 %	51 % 485,70 g/l 4,85 g on 10 ml	

Tabelle 3: VOCs in GROHE products