German Federal Institute for Risk Assessment

FAQ

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Undesirable by-product in spirits: methanol

→ Changes compared to the version of 21 September 2012: Update of the regulatory information on methanol and the summary

Methanol is the simplest chemical compound in the group of alcohols. It is one of the so-called industrial alcohols and is used in the motor industry, among other things. However, methanol can also form as an undesirable by-product in alcoholic beverages. This can pose health risks, which can affect the eyes and nerves. Extreme methanol poisoning can even lead to death. Below, the BfR has summarised some questions about methanol in spirits.

What is methanol?

Methanol (methyl alcohol, CH_3OH) is a liquid and the simplest chemical compound in the group of alcohols. It is produced in large quantities as a so-called industrial alcohol. This alcohol is used as a solvent, as an additive to high-performance fuels for racing and aircraft piston engines, in fuel cells instead of hydrogen gas and also as a pure biofuel in various countries. Methanol is also the raw or starting material for numerous other chemical compounds such as formaldehyde, acetic acid and various polymer plastics.

Which effects does methanol have on the organism?

Methanol is toxic even in small quantities. The liquid damages the nerves in particular because the metabolites formaldehyde and formic acid have a high neurotoxic (nerve-damaging) potential. The optic nerve is particularly affected by methanol poisoning. Even a single intake of 4 to 5 grams of methanol can cause blindness in particularly sensitive people. Deaths due to respiratory paralysis, cerebral oedema, circulatory collapse and uraemia (urine in the blood) have also been reported following the intake of larger quantities.

How is methanol formed?

Methanol is formed as an unwanted by-product during the fermentation of sugar in fruit or starchy crops to produce drinkable alcohol (ethanol) in the mash. The methanol produced can be removed from high-proof alcoholic beverages using suitable techniques and distillation processes. Anyone who produces alcoholic beverages themselves without expertise risks high levels of methanol in the end product.

Are there maximum levels for methanol in alcoholic beverages?

The Spirits Regulation (EU) No. 2019/787 sets out maximum permitted levels of methanol for individual product groups in Annex I. For vodka, for example, a maximum content of 10 grams of methanol per hectolitre of pure alcohol is specified, while a maximum content of 1,500 grams per hectolitre of pure alcohol is specified for spirits made from fruit pomace. A vodka with 37.5% alcohol by volume may therefore contain a maximum concentration of 0.0375 grams of methanol per litre of end product.

How can methanol poisoning be recognised?

Methanol can be absorbed into the body both via the respiratory tract as well as through the consumption of spirits. The first symptoms of intoxication can occur after a few hours, but on average after 24 hours.

The most common symptoms include nausea, vomiting, headaches and dizziness. Visual disturbances, unconsciousness and muscle cramps can also occur. In extreme cases, methanol poisoning can lead to circulatory arrest and death.

What should I do if methanol is ingested?

If methanol is accidentally ingested, it is advisable to contact a poison centre (GIZ). Make sure you have the product or label ready so that the GIZ can trace the ingredients | components. In this way, important information can be collected, e.g. the concentration of the ingredient | component, which can help the hospital or clinic to take the necessary treatment measures.

You can find more information on this in the BfR poisoning app. It is possible to call one of the nine responsible German GIZ directly from the app.

About the BfR

The German Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the portfolio of the Federal Ministry of Food and Agriculture (BMEL) in Germany. The BfR advises the Federal Government and the States ('Laender') on questions of food, chemicals and product safety. The BfR conducts independent research on topics that are closely linked to its assessment tasks.

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