
ENVIRONMENTAL Fact Sheet



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Methyl Ethyl Ketone: Health Information Summary

Methyl ethyl ketone (MEK), also known as 2-butanone, is a clear liquid with the odor of mint. Although most of the MEK in the environment is synthetically produced, some natural sources exist including some foods (raw chicken, milk, some cheeses), certain plants and trees, including those used for food, and tobacco smoke. MEK is used as a solvent in vinyl films, paint removers, lacquers, varnishes, adhesives and cleaning fluids. It is also used in the synthetic rubber industry and in the production of paraffin wax, magnetic tapes and lubricating oil.

MEK is a component of adhesives commonly used to join polyvinyl chloride (PVC) pipe. Therefore, it may temporarily be found in drinking water if water pipe repair or water well construction has recently occurred.

Because of its high volatility, the most important source of environmental MEK exposure will be from the air. MEK does not adsorb strongly to soil and is very water soluble. Therefore, MEK released to soil is expected to leach to groundwater. Once in groundwater, it takes about two weeks for MEK to degrade.

Because the odor thresholds reported for MEK in water and air are greater than expected environmental contamination levels, odor is not likely to provide any warning that MEK is present.

Health Effects

Absorption/Metabolism

MEK is quickly absorbed by ingestion, inhalation and dermal exposure. In an experiment with humans, inhalation absorption was about 50 percent to 55 percent. There is no absorption data for the oral and dermal routes. Information on the metabolism of absorbed MEK indicates that it does not build up in the body and is likely completely eliminated within a few days after exposure.

Short-Term (Acute) Effects

Inhalation exposure to high concentrations of MEK would be expected to cause central nervous system depression. This has been seen in animals exposed to high doses by inhalation.

Effects to animals exposed to high concentrations of MEK vapor by inhalation were irritation of the nose and eyes, respiratory difficulty, lack of coordination and loss of consciousness. Liver, lung, kidney and brain abnormalities were also reported.

Long-term (Chronic) Effects

Animals exposed to MEK in drinking water reported slight anemia at a concentration of 12,000 milligrams per liter (ppm). Mild kidney damage was seen in another drinking water study. In a three-month inhalation study, animals exposed to MEK had decreased brain weights.

There is some experimental evidence that when combined with certain other solvents, MEK exposure can increase the toxicity of these solvents or reduce the time it takes for toxicity to occur. This effect is known as "potentiation." When MEK was combined with n-hexane exposure, nervous system toxicity was increased. Liver and kidney toxicity increased when MEK was combined with carbon tetrachloride or chloroform exposure. Potentiation has only been observed at relatively high MEK concentrations that are unlikely to occur other than from occupational or accidental exposures.

Carcinogenic (cancer-causing) Effects

No increase in cancer incidence was seen in two human studies investigating long-term occupational exposure to MEK. There are no adequate animal studies with which to evaluate MEK's carcinogenicity. However, comparisons with chemicals of similar structure suggest that MEK has a low carcinogenic potential. Because there is not enough information with which to make an informed judgment, MEK fits into the EPA carcinogen categorization scheme in the "inadequate evidence to assess carcinogenic potential" classification.

Reproductive/Developmental Effects

In a study that lasted for several generations, animals were exposed to MEK in drinking water. Increases were noted in fetal skeletal abnormalities. There was no effect on reproduction. A decrease in newborn weight was also noted at the same dose with no effects seen at the next lowest dose.

In animal studies with MEK exposure by inhalation, developmental effects similar to those in the drinking water exposure study, decreased fetal weight and skeletal abnormalities, were also observed.

Health Standards and Criteria

The U.S. Environmental Protection Agency Lifetime Drinking Water Health Advisory (LHA) for MEK is 4,000 micrograms per liter (ug/l). The LHA is based on a significant reduction in body weight that was observed at some MEK exposure concentrations in an animal developmental study. New Hampshire has adopted the LHA as an appropriate ambient groundwater quality standard.

The Occupational Safety and Health Administration enforceable standard (permissible exposure limit or PEL) for MEK in workplace air is 200 ppm averaged over eight hours.

For more information, please contact the DES Environmental Health Program, 29 Hazen Drive, Concord, NH 03302-0095; (603) 271-4608.

Suggested Reading and References

Casarett and Doull's Toxicology: The Basic Science of Poisons, Sixth Edition. Klaassen, C.D., ed. McGraw-Hill Publishing Co., Inc., New York, 2001.

Toxicological Profile for 2-Butanone (Update). Agency for Toxic Substances and Disease Registry (ATSDR). Atlanta, GA. July, 1992.

Toxicological information on methyl ethyl ketone. Integrated Risk Information System (IRIS). U.S. EPA, Office of Health and Environmental Assessment. Last significant revision: September, 2003.

Toxicological Review of methyl ethyl ketone. In support of summary information on the Integrated Risk Information System (IRIS). U.S. EPA, Office of Solid Waste and Emergency Response. September, 2003.