Methanol Health Effects

Methanol is a colorless liquid with a mild alcohol odor. It is widely used as a chemical feedstock to produce a variety of consumer products. While consumer exposure to methanol should be avoided and will continue to be minimized with the use of well-engineered fuel containers meeting stringent requirements, it is useful to review the health effects of exposure to methanol.

Methanol is toxic to humans, and is readily absorbed by ingestion and inhalation, and more slowly by skin exposure. However, methanol is already present within the human body in small quantities from eating fruits and vegetables. According to the FDA, as much as 500 milligrams per day of methanol is safe in an adult's diet. In the body, methanol is metabolized in the liver, converted first to formaldehyde, and then to formate. As a building block for many biological molecules, formate is essential for survival. High levels of formate buildup after excessive methanol intake, however, can cause severe toxicity and even death. Refueling a fuel cell car with methanol will only give low-dose exposures (23-38 ppm for a few minutes), with a small intake of 3 milligrams of methanol. This is less than drinking a single can of diet soda containing 200 milligrams of aspartame, an artificial sugar containing methanol, which would produce 20 milligrams of methanol in the body.

The initial symptoms of methanol poisoning (drinking one to four ounces) may be delayed for as long as 12 to 18 hours as the body metabolizes methanol to formate, and can consist of weakness, dizziness, headache, nausea vomiting and blurred vision. In severe cases of accidental or reckless ingestion, methanol poisoning may lead to permanent blindness or death, although complete recovery is the rule in patients admitted early to a hospital. There are several treatments available to combat methanol poisoning, including early treatment with sodium bicarbonate to help prevent visual impairment. In a hospital setting, hemodialysis is effective in removing both methanol and formate from the blood, and co-exposure to ethanol has been shown to reduce formate levels. In case of skin exposure to methanol, washing immediately with soap and plenty of water can prevent further skin absorption.

Methanol exposure should be avoided and can be managed safely through the proper design of fuel containers and fueling systems. A spill-free nozzle has been developed by Identic of Sweden that features a dry-connection to the fuel cell car that makes it virtually impossible for the consumer to contact methanol from the pump or the vehicle.

Symptoms of Methanol Poisoning

Weakness
Dizziness
Headache
Nausea
Vomiting
Blurred Vision
Blindness
Death

Treatments

Sodium Bicarbonate
to prevent visual impairment

Hemodialysis
to remove methanol and formate from blood

Co-Exposure to Ethanol

Spill Free Nozzle