

Environmental Health Fact Sheet

Methane

What is methane?

- Methane is a colorless, odorless, tasteless, flammable gas that can cause oxygen-deficient air-spaces, fire hazards, or explosions.
- Methane is produced by decaying organic matter.
- Methane is the main constituent in natural gas.
- Methane is a vital component of the world's supply of energy.
- Methane is slightly soluble in water.

What are the uses of this gas?

- Methane is primarily used for heating, cooking, and generating electricity.
- Methane can also be used to make other chemicals such as hydrogen, ammonia, acetylene, and formaldehyde.

Is methane present in the environment?

- Methane is usually associated with oil deposits that are 1 to 2 miles below the earth's crust. Deeper deposits, very far underground, usually contain primarily natural gas, and in many cases, pure methane. Natural gas is abundant throughout Pennsylvania in the Marcellus shale.
- Methane can be transported by ground water in dissolved or gaseous states.
- Methane can bubble up from underground sources through marshes and bogs and enter the atmosphere.
- Methane can also enter the environment after being produced in waste-containing landfills by bacteria that breakdown landfill material.
- Methane can enter buildings through cracks in foundations or sewer traps. Methane can also enter homes with private wells if groundwater becomes contaminated.
- Methane in ground water is not explosive. When water containing dissolved methane comes into contact with air, the methane quickly escapes from the water into surrounding air. If this occurs in a confined space, the methane could ignite. If it is allowed to accumulate, it could explode.

- Methane-producing bacteria also live in the intestinal tract of most animals and humans. Very small amounts of methane are released into the environment through flatus.
- Methane evaporates into air quickly from private well water.

How are people exposed to methane?

- Most exposures occur when people inhale methane in their homes.
- Exposures can occur when contaminated ground water is used for drinking and food preparation.
- Methane gas does not readily pass through skin.

What happens to methane once it enters the body?

- Methane does not accumulate in the body and is rapidly eliminated in breath, urine, and flatus.

How harmful is exposure to methane?

- Methane has no demonstrable toxicity other than being a simple asphyxiant.
- Before increasing concentrations reach asphyxiating levels, methane forms explosive mixtures with air.
- When methane is present at high concentrations in air, it displaces oxygen and can cause symptoms of oxygen deprivation.
- Effects of decline in oxygen levels:
 - a. 12-16% oxygen level - breathing and pulse rate are increased, with slight loss of muscular coordination;
 - b. 10-14% - emotional upsets, abnormal fatigue from exertion, disturbed respiration;
 - c. 6-10% - nausea and vomiting, inability to move freely, collapse, possible lack of consciousness;
 - d. Below 6% - convulsive movements, gasping, possible respiratory collapse and death.
- Effects of oxygen deprivation may or may not reverse with time. Survivors of oxygen deprivation may show damage to some or all organs including the brain.
- Oxygen levels below 19.5% may produce harmful health effects.
- Methane is not a skin irritant. However, contact with refrigerated liquefied gas or compressed gas escaping from its cylinder may cause cold burns or frostbite.
- Well water containing dissolved methane at concentrations greater than 28 milligrams per liter (mg/L) can liberate potentially flammable or explosive quantities of gas.

- Air concentrations of methane between 5% or 50,000 parts per million (ppm) and 15% or 150,000 ppm are potentially explosive.

Can exposure to methane cause cancer?

- Methane is not expected to cause cancer.

Is there a medical test to show whether I've been exposed to methane?

- There are tests that measure the amount of methane in blood or serum/plasma, but these tests cannot predict if health effects will occur.

What is the treatment for methane poisoning?

- Emergency medical care should be sought in cases of suspected methane poisoning.
- Methane poisoning is treated by removing the person from the source and then with supportive medical care in a hospital setting.
- No specific antidote exists for methane poisoning.

Are there recommendations to protect public health?

- The National Institute for Occupational Safety and Health (NIOSH) recommends a maximum safe methane concentration for workers during an 8-hour period of 1,000 parts per million (0.1 percent).

What can I do to prevent exposure to methane?

- Identify and eliminate all sources of exposures to methane. Because of its explosive nature, efforts should be made to avoid buildup of methane in air.

What should I do if I believe I am ill as a result of exposure to methane?

- If you experience symptoms that you think may be related to methane exposure, you should consult your physician.

Where can I get more information?

For more information, contact:

The Pennsylvania Department of Health, Division of Environmental Health Epidemiology, P.O. Box 90, Harrisburg, Pennsylvania, 17108. Telephone number: 717-787-1708 or visit the following websites:

The Agency for Toxic Substances and Disease Registry's Information Center at [ATSDR - Contact Information](#) or at telephone number 800-232-4636.

References

- (1) Overview of Natural Gas, Background, NaturalGas.org searched 6/21/11 at <http://www.naturalgas.org/overview/background.asp>.
- (2) Spacecraft Maximum Allowable Concentrations for Selected Airborne Contaminants, Volume 1 (1994), p 149-168, Commission on Life Sciences, National Academy Press, the National Academies.
- (3) Fact Sheet 2006-3011, January 2006, USGS.
- (4) Alberta Agriculture, Food and Rural Development, Methane (CH₄) Safety, Agri-Facts, August 2004].
- (5) NMS Labs, 3701 Welsh Road, Willow Grove, Pennsylvania 19090, searched 6/22/11 at <http://www.nmslab.com/test-catalog/alpha/M>.
- (6) Canadian Centre for Occupational Health and Safety, > 2-Health Effects of Methane searched 6/21/11 at http://www.ccohs.ca/oshanswers/chemicals/chem_profiles/methane/health_met.html
- (7) U.S. Department of Labor, Occupational Safety and Health Administration, Fatalities in asphyxiating atmosphere, searched on 6/28/11 at http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=PREAMBLES&p_id=839.