

Risks and Safety Hazards of Methane

What is Methane?

Chemical Compound: CH₄

CAS Number: 74-82-8

Methane, or methyl hydride, is a colourless, odourless gas which is lighter than air. In the atmosphere, the gas is transformed into water and carbon dioxide; it is also one of the most potent greenhouse gases.

Other names: fire damp, marsh gas, biogas, methyl hydride, carbane

Chemical Forms



Chemical Properties

Molecular weight:	16.043 g/mol
Boiling point:	-161°C
Melting point:	-183°C
Relative density, gas (air=1)	0.6
Auto-ignition temperature	537°C
Gas Colour	colourless

Safety Hazards of Methane



Methane hazards can occur during manufacture, use, and transportation. Although we inhale methane as we breathe, exposure to high concentrations of methane is dangerous. Hazardous events occur due to accidents during transport, accidental releases at manufacturing facilities, and farming accidents.



Methane is a highly flammable and explosive gas, quickly ignited when exposed to heat, sparks or flames. When CH₄ accumulates, 5 – 15% by volume, within a mixture of air, it forms a highly explosive gas. Above 15% (150,000 ppm), insufficient oxygen is present in the air.



Risk of exposure can occur through:

- Accidental Release
- Leak
- Transportation



Methane gas can be measured using a gas detector fitted with a *non-dispersive infrared (NDIR) sensor*

Health Risk: Methane Exposure Effects



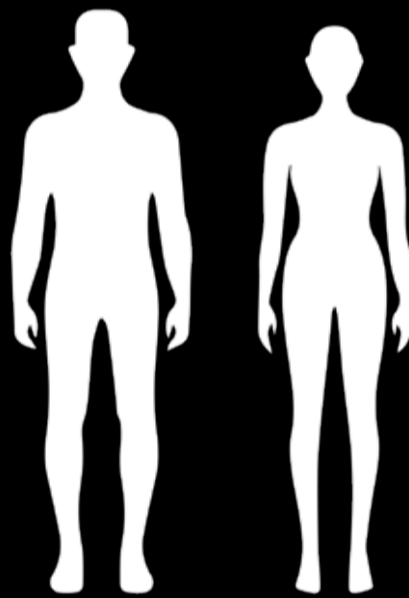
EYES

- Frostbite
- Irritation



SKIN

- Frostbite



HEAD

- Loss of consciousness
- Drowsy



RESPIRATORY SYSTEM

- Difficulty breathing
- Suffocation
- Acute pulmonary toxicity

Working Exposure Limits of Methane

Currently, there are no specified occupational exposure limits for methane gas. The National Institute for Occupational Safety and Health's (NIOSH) in the United States recommends a maximum of 1000 ppm (0.1%) during an eight-hour work period.

Occupational Exposure Standards

Exposure level	
NIOSH 8-hours TLV*	1000 ppm
Potentially explosive	50,000 to 150,000 ppm
Asphyxiation	500,000 ppm

1000ppm

TWA concentration can result in irritation to workers.

Dangers of Chemical Plumes

How long for methane gas to dissipate? The duration and behaviour of a chemical plume are dependent on many factors. These include the volume released, ambient temperature, time of day, relative humidity, wind direction and speed, terrain, natural and urban barriers, and environmental absorption factors such as dense and sparse foliage.

Methane can be released into the air from underground spaces or unplanned releases. Accidental leakages in the industrial sector can result in extremely large releases of CH₄ to the atmosphere from even a single-point failure.