

SAFETY MEMO

December 13th, 2021 – Hydrogen (H₂) – CAS#1333-74-0



Did you know?

What is Hydrogen?

Hydrogen (H₂), also known as dihydrogen or molecular hydrogen, is a colourless, odorless gas which is extremely flammable. Hydrogen is often stored in compressed gas tanks or cylinders for industrial use.

Where do we find it?

Hydrogen is often used in the following ways:

- Reactant in hydrogen fuel cells for energy.
- Hydrogenating agent in food.

How to Protect Yourself?

- Ensure there is adequate ventilation at points of use or containment.
- Protect storage areas from sunlight or heat, maintaining storage temperatures below 52°C / 125.6°F
- Avoid contact with eyes and skin by using chemical-resistant gloves and clothing, as well as safety eyewear.
- Avoid inhalation, use a fitted respirator that is compatible with hydrogen gas.
- Install gas detection and alarm systems.
- Do not store with flammable or oxidizing substances or near ignition sources.

Why is it a Hazard?

Hydrogen has an extreme risk of fire and explosion when exposed to an ignition source, particularly in the presence of an oxidizing agent, and burns with an invisible flame. The explosive (flammable) limits of hydrogen gas is between 4% and 76% in air. Within this range, hydrogen will burn and explode in the presence of an ignition source.

Additionally, in the case of a sudden leak or release of hydrogen, the expanding gas cools the surrounding air. This cooling of the surrounding air can, in some cases, cause frostbite.

Finally, hydrogen can displace air, resulting in localized areas of low oxygen concentration, which can cause asphyxiation. Due to the relative density of hydrogen, this accumulation typically occurs at high elevations in a room or contained space.

Design Considerations

Adequate ventilation is critical to worker safety and is needed to ensure that concentrations are below the limits for both explosion risk, and asphyxiation risk. Explosion-proof ventilation systems should be used. Emission limits should also be maintained as per environmental protection regulations, and gas streams may require additional processing before release to the atmosphere.

NFPA 2 (Hydrogen Technologies Code) outlines requirements for the “generation, installation, storage, piping, use, and handling of hydrogen in compressed gas (GH₂) form or cryogenic liquid (LH₂) form”.

Here are some additional examples of typical mitigation and containment measures that can be implemented:

- Equipment Design (instrumentation, automation, detection devices, compatible materials).
- Storage quantities and location (small volume, outdoors away from existing buildings and public pathways).

