Gas Chromatograph -Hydrogen Gas Safety

Gas Chromatograph-GC

The purpose of the Gas Chromatograph (GC) is to analyze samples of chemicals and determine the composition. Units can be installed both on industrial plant and lab facilities. Samples are fed into the Gas Chromatograph using carrier gases including hydrogen and nitrogen. Gas Chromatograph Hydrogen Gas Safety-Hydrogen gas (H2) is used for the flame ionization detector (FID) in gas chromatographs (GC). Hydrogen is a dangerous gas that explodes easily.

Hazards Associated with Gas Chromatograph During Operation

- If hydrogen gas accumulates in the gas chromatograph oven, it could potentially ignite. For example, if hydrogen gas is continuously introduced at room temperature into a 15 L enclosed space at a rate of 40 mL/min (recommended flowrate for FID), it is calculated to reach the explosion limit (4 %) after 15 minutes. However, if the gas concentration inside the space is not uniform, the explosion limit may be reached in a shorter time.
- Hydrogen gas leaking from tubing could potentially ignite. If hydrogen gas released from the gas chromatograph accumulates in the room where it is installed, it could potentially ignite. If hydrogen gas is discharged from the high-pressure gas cylinder, sudden expansion of the gas could potentially cause it to ignite.

Procedures for operating the gas chromatograph using hydrogen carrier gas are described below.

- ✓ Before starting up the instrument, open the main valve on the carrier gas cylinder to check that carrier gas is being supplied to the gas chromatograph.
- ✓ Check that there are no leaks in the tubing system.
- ✓ Start up the instrument according to the procedure described in the Gas Chromatograph User's Guide.
- ✓ Perform analysis.
- ✓ When shutting down the instrument, perform Shutdown according to the procedure described in the Gas Chromatograph Instruction Manual.
- ✓ Close the main valve on the carrier gas cylinder.

Hierarchy of control: -Eliminating the Hazard

AIMS AP5-TFS Analyzer

- ✓ Reduction of lifting and manual handling hazard to minimum.
- ✓ Easy installation as compared to conventional analyzers.
- ✓ Analyzer doesn't require any carrier gas cylinder hence transportation and handling of pressurized and hazardous gas such as Hydrogen and Helium cylinders is avoided.
- ✓ Frequency and time spent inside Red Zone is reduced.
- ✓ Increase the safe man hour by reducing less exposure to H2S environment
- ✓ Exposure to toxic and flammable gas is reduced as there are no moving parts in TFS analyzer hence chances of gas leak is minimized.
- ✓ Emission of gasses is zero keeping the environment clean as there is no flame production in TFS operation.
- ✓ Exposure to high temperature surfaces is also avoided (as in GC ovens)
- ✓ Eliminating Ergonomic Hazard as Simple design ensures easy maintenance and access to all parts of analyzer.
- ✓ Reduction in occupational health hazards and illness.

Recommended Emergency Measures

If hydrogen gas has accumulated or if there is a power outage, follow the procedure below to stop the supply of hydrogen gas and eliminate hydrogen gas from the room.

- ✓ Immediately stop the supply of hydrogen gas. Switch OFF power to the gas chromatograph.
- ✓ Open the windows and doors of the room where the instrument is installed to thoroughly ventilate the room. Confirm that there is no ignition source in the room that could ignite the hydrogen gas.
- ✓ Wait until the temperature of all gas chromatograph components has fallen to the ambient temperature.
- ✓ Open the door of the gas chromatograph.

"Remember The Hierarchy of Hazard Control Measures ERICPDA"

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