



UNIVERSITY of NEW HAMPSHIRE

Hydrogen Generators

Hydrogen is a highly flammable gas that can form an explosive mixture in air with a range of 4 to 75% by volume. Hydrogen generators can provide a cost effective method of supplying high purity hydrogen for laboratory applications that reduces the risk associated with the use and storage of hydrogen gas cylinders. Hydrogen generators may be used with most instrumentation and processes requiring hydrogen. Examples include flame ionization detectors and gas chromatography applications, but also include any specialized setting where high purity hydrogen is used or where fuel cell research, electrochemistry, semiconductor and materials research, is conducted.

Hydrogen generators for use in laboratory settings share some common features:

- Most advertise high purity hydrogen production (99.999%). The presence and quantity of contaminants, such as oxygen, nitrogen, and water, can be obtained from each manufacturer.
- Most hydrogen generators are small in size and weight, generally occupying 1-2 square feet of bench space and weighing between 30-60 lbs.
- Laboratory hydrogen generators can be purchased at a variety of maximum flow rates starting at approximately 100 cc/min and ranging up to approximately 1,200 cc/min. Larger flow rates may be available from the manufacturer.
- Most periodic maintenance can be done in the laboratory, by the user, and typically includes replacing desiccant cartridges and/or deionizer bags.
- Some manufacturers offer combination gas generators, such as hydrogen and zero air.

When considering the purchase of hydrogen delivery equipment there are many issues to take into account. Generators produce hydrogen on demand by the electrolysis of water. The concern for excessive hydrogen leaks is reduced because only a small quantity of hydrogen is present in the instrument at any time. The National Fire Protection Agency (NFPA) limits the number of flammable compressed gas cylinders allowed in laboratory work areas as a result for concern for leakage and fire (up to 6 ft³ gas cylinder capacity per 500 square feet of laboratory space). Hydrogen generators generally keep the hydrogen at low pressures (100-200 psi), eliminating any hazards associated with sudden releases of high pressure. Periodic maintenance requirements vary slightly among manufacturers, but are typically designed in such a way that most maintenance can be done in the lab in a timely manner.

Select a hydrogen generator with care. Although a few hydrogen generators may require the user to add a caustic solution to produce hydrogen gas, most generators for laboratory applications need only distilled or de-ionized water. Generators that use only water are more desirable as they eliminate the hazards associated with handling additional chemicals. While only small quantities of hydrogen are stored in the instrument, hydrogen is a flammable substance. Care should be taken to select a generator equipped with appropriate leak detectors.

ENVIRONMENTAL HEALTH AND SAFETY

Perpetuity Hall 11 Leavitt Lane Durham New Hampshire 03824-3522
603-862-4041 603-862-0047 fax <http://www.unh.edu/ehs>