- It is widely used for the manufacture of metal hydrides.
- It is used as rocket fuel in space research.
- Dihydrogen is used in fuel cells for generating electrical energy. If has many advantages over the conventional fossil fuels and electric power. It does not produce any pollutions and releases greater energy per unit mass of fuel in comparison to gasoline and other fuels.

HYDRIDES Section - 2

Binary compounds of the elements with hydrogen are called hydrides. The type of hydride which an element forms depends upon its electronegativity and hence on the type of bond formed. Hydrides are conveniently studied under three classes.

(i) Ionic or salt like hydrides

(ii) Covalent or molecular hydrides

(iii) Metallic or interstitial hydrides

- **Ionic or salt like hydrides :** These are formed by metals of low electronegativity, i.e. alkali and alkaline earth metals by direct reaction with H_2 and some highly positive members of lanthanide series with the exception of Be and Mg whose hydrides show significant covalent character.

  The stability of the hydrides decreases as the size of the cation increases.

  $$LiH > NaH > KH > RbH > CsH$$

  $$CaH_2 > SrH_2 > BaH_2$$

  CaH_2 is called *Hydrolith*.

- **Covalent or Molecular hydrides :** These hydrides are formed by all the true non-metals (except zero group elements) and the elements like Al, Ga, Sn, Pb, Sb, Bi. Po, etc., which are normally metallic in nature. The simple hydride of B and Ga are dimeric materials, B_2H_6 (diborane) and Ga_2H_6 respectively and the hydride of aluminium is polymeric in nature, $(AlH_3)_n$.

- **Metallic or interstitial hydrides :** Many transition and inner-transition elements at elevated temperatures absorb hydrogen into the interstices of their lattices to yield metal-like hydrides, often called the interstitial hydrides. These hydrides are often non-stoichiometric and their composition vary with temperature and pressure. Formulae of some of the hydrides of this class are :

  $$TiH_{1.73}, CeH_{2.7}, LaH_{2.8}, PdH_{0.60}, ZrH_{1.92}$$

  The interstitial hydrides have metallic appearance and their properties are closely related to those of the parent metal. They possess strong reducing properties probably due to the presence of free hydrogen atoms in the metal lattice.