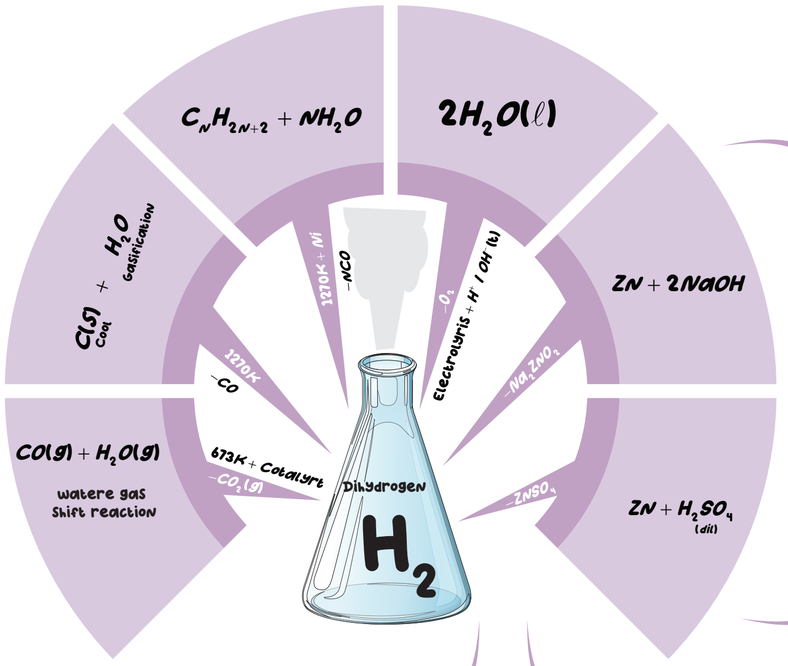
HYDROGEN



USES

- Synthesis of ammonia
- Manfacture of vanaspati fat
- Preparation of HCl
- If fuel cells
- As a rocket fuel

PHYSICAL PROPERTIES

- Colourless
- tasteless
- odorless
- Combustible
- Lighter than air
- Cinsoluble in water

CHEMICAL PROPERTIES

$H_{2(g)} + X_{2(g)} \rightarrow 2HX_{(g)} (X = F, Cl, Br, I)$

$2H_{2(g)} + O_{2(g)} \xrightarrow{\text{Catalyst } \Delta} 2H_2O(\ell)$

$3H_2 + N_{2(g)} \xrightarrow[Fe]{673k,\ 200\ atom} 2NH_{3(g)}$

$H_2 + 2M_{(g)} \rightarrow 2NH_{3(s)}$ M = alkali metal

$H_2 + Pd^{2+}_{(aq)} \rightarrow Pd + 2H^+_{(aq)}$

$H_2 + CO + RCH = CH_2 \rightarrow RCH_2CH_2CHO$

$H_2 + RCH_2CH_2CHO \rightarrow RCH_2CH_2CH_2OH$

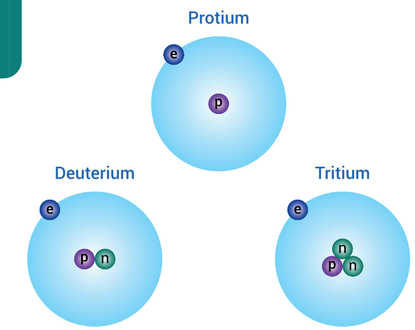
OCCURENCE

Lightest Element in the periodic table

If exists as diatomic gas (H_2) at STP.

Most abundant Element

ISOTOPES OF HYDROGEN



HEAVY WATER H_2O

- Preparation: By enchanting electrolysis of water.
- Uses: As a moderator in nuclear reactors in exchange reactions for the study of reaction mechanisms.

PHYSICAL PROPERTIES

- Colourless and testeless
- Hight freeging point, B.P, high heat of vaporization, high heat of funon

CHEMICAL PROPERTIES

$H_2O_{(\ell)} + NH_{3(aq)} \rightleftharpoons OH^-_{(aq)} + NH^+_4$

$2H_2O_{(\ell)} + 2Na_{(s)} \rightarrow 2NaOH_{(aq)} + H_{(g)}$

$6CO_{2(g)} + 12H_2O \rightarrow C_6H_{12}O_{6(aq)} + 6H_2O_{(\ell)} + 6O_{2(g)}$

$P_4O_{10(s)} + 6H_2O_{(\ell)} \rightarrow 4H_3PO_{4(aq)}$

WATER H_2O

COMPOUNDS

SOFT WATER: water that produces sufficient later with Soap

HARD WATER: If forms an involuble sum before it form lather with Soap

- Temporary hardness Bicarbonates of mg/ca
- Permanent Hardness Sulfates or cl of mg/ca

HYDROGEN PEROXIDE H_2O_2

PREPARATION

$BaO_2 \cdot \delta H_2O_{(s)} + H_2SO_{4(aq)} \rightarrow BaSO_{4(s)} + H_2O_{2(aq)} + 8H_2O$

$2HSO^-_4 \xrightarrow{\text{Electrolysis}} HO_2SOOSO_3H_{(aq)}$

$\downarrow$

$2HSO^-_4 + 2M^+ + H_2O_{2(s)}$

2 ethylarthraquinol $\underset{H_2 / Pd}{\overset{O_2 (air)}{\rightleftharpoons}}$

H_2O_2 + oxidising product

PHYSICAL PROPERTIES

- Colourless (very pale blue)
- Miscible with water

USES

- As hair bleach, disinfectant
- Manufacture chemicals used in detergents
- In environmental Chemistry

CHEMICAL PROPERTIES

$PbSO_{4(s)} + H_2O_{2(aq)} \rightarrow PbSO_4 + 4H_2O$

$HOCl + H_2O_2 \rightarrow H_3O^+ + Cl + O_2$

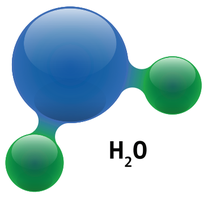
$Mn^{2+} + H_2O_2 \rightarrow Mn^{4+} + 2OH^-$

$I_2 + H_2O_2 + 2OH^- \rightarrow 2I^- + 2H_2O + O_2$

TYPES OF HYDRIDES

IONIC

- Stoichiometric compounds of dihydrogen formed with S block element
- Also known as Saline Hydrides



COVALENT

- Formation of molecular compounds from dihydrogen & block elements
- Also known as molecular hydrides

METALLIC

- Formed by D & F block Elements
- Also known as NON - Stoithiometric or interstitial hydrides

1 H HYDROGEN 1.008

HYDROGEN ECONOMY

- Use of Hydrogen as alternate source of energy
- Non polluting