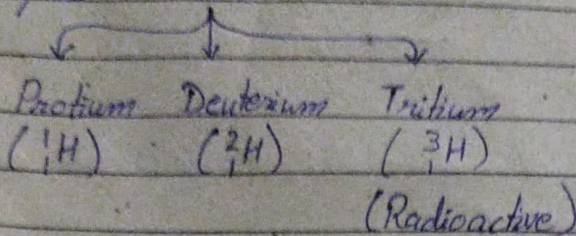


Hydrogen

Atomic number $\rightarrow 1$

Isotopes $\rightarrow 3$



Electronic configuration $\rightarrow 1s^1$

Position in periodic table \rightarrow subject of discussion

Hydrogen can give e^- to form H^+
(like group-1 elements)

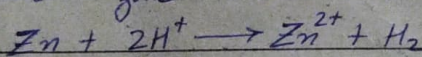
Hydrogen can also lose e^- to form H^-
(like group-17 elements)

So, some properties matches with group-1 elements and some with group-17.

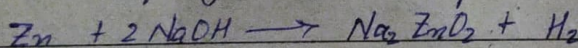
Preparation of H_2 (Dihydrogen)

\rightarrow Laboratory preparation.

- Granulated zinc with dil. hydrochloric acid:



- Reaction of zinc with aq. alkali:

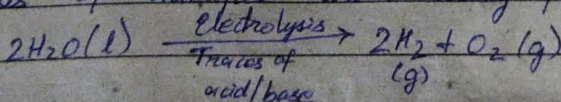


Sodium

Zincate.

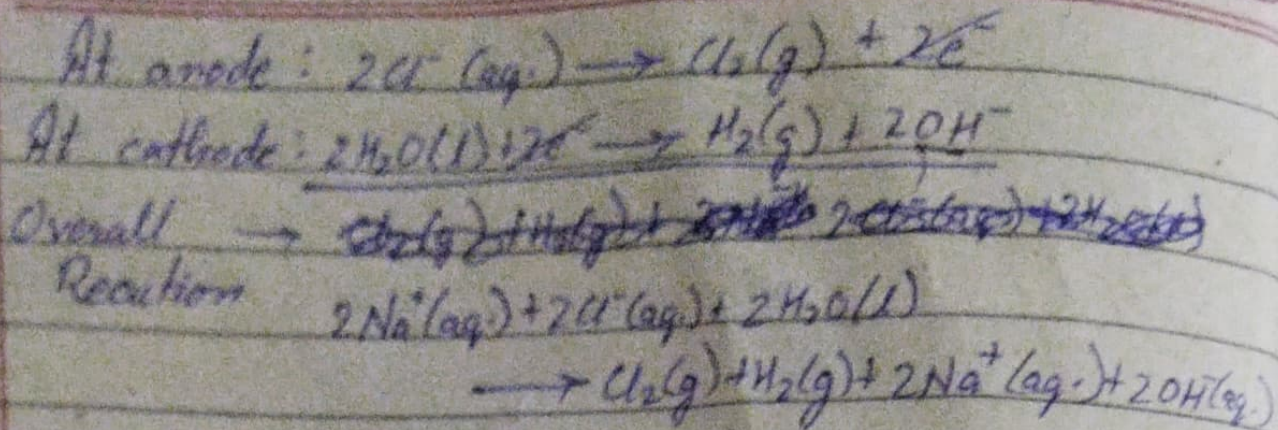
\rightarrow Commercial production

- Electrolysis of acidified water using platinum electrodes.

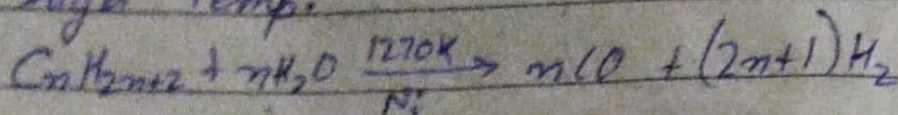


- Electrolysis of warm aq. barium hydroxide solⁿ using nickel electrodes (99.95% pure H_2)

- Electrolysis of brine solⁿ:



- Reaction of steam on hydrocarbons or coke at high temp:

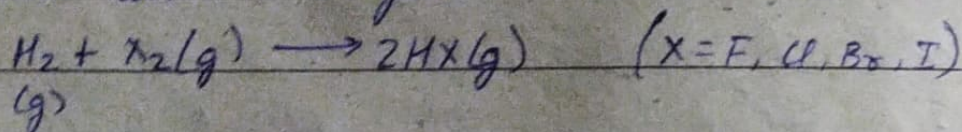


Physical properties of H_2 :

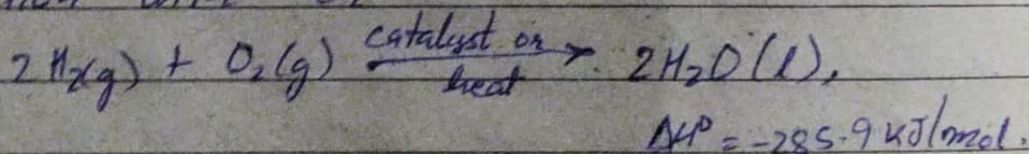
- Colourless
- Odourless
- Tasteless
- Combustible gas
- lighter than air
- insoluble in water.

Chemical properties of H_2 :

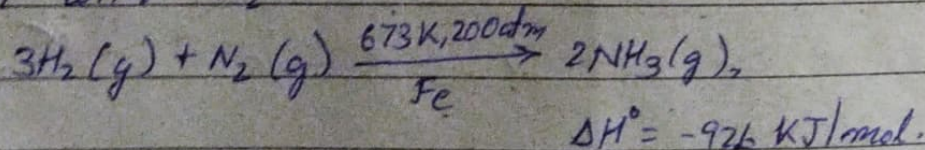
- Reaction with halogens:



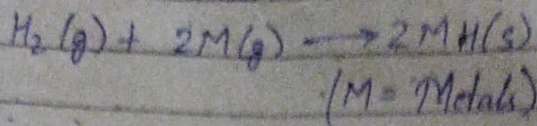
- Reaction with O_2 :



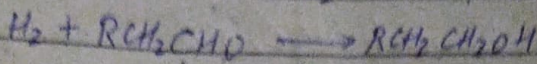
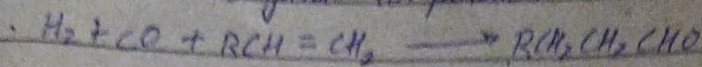
- Reaction with N_2 :



• Reaction with metals:



• Reaction with organic compounds:



Uses of dihydrogen:

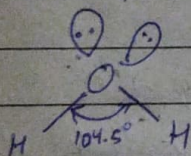
- synthesis of ammonia & nitrogenous fertilizers.
- manufacture of vanaspathi fat.
- used as rocket fuel in space research.
- used as fuel cells for generating electrical energy.

Water

physical properties:

- colourless & tasteless liquid
- In comparison to other liquids, water has higher specific heat, thermal conductivity, surface tension, dipole moment and dielectric constant, etc.

Str. of water:



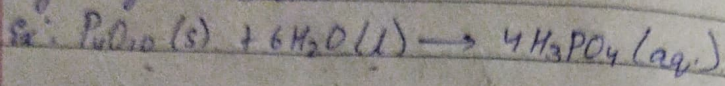
str.: bent.

Chemical properties:

- Amphoteric nature: can act as an acid as well as base
- Hydrates formation: From aq. solⁿ, many salts can be crystallized as hydrated salts:
 - (i) Coordinated water
 - (ii) interstitial water
 - (iii) hydrogen-bonded water.

(iii) Water can be easily reduced to dihydrogen by highly electropositive metals.

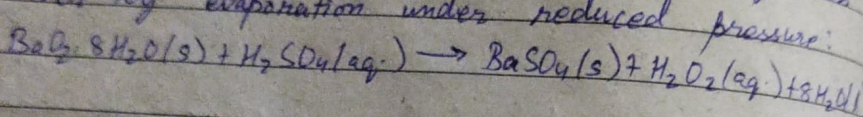
(iv) Hydrolysis reaction:



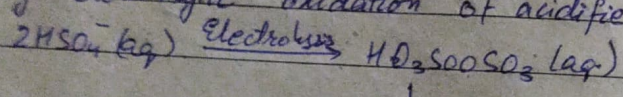
Hydrogen peroxide (H_2O_2)

Preparation

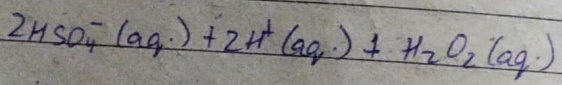
(i) Acidifying barium peroxide and removing excess water by evaporation under reduced pressure:



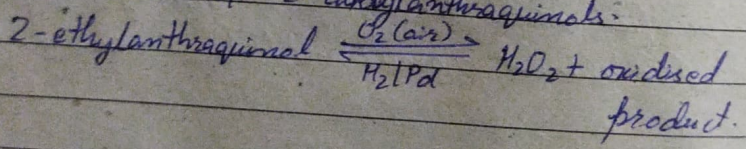
(ii) By electrolytic oxidation of acidified sulphate salt:



↓ Hydrolysis



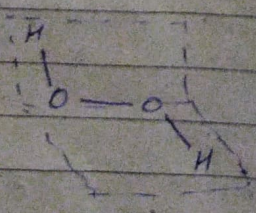
(iii) Auto-oxidation of 2-alkylanthraquinols:



Physical properties

- almost colourless (very pale blue) liquid.
- miscible with water & forms hydrate $\text{H}_2\text{O}_2 \cdot \text{H}_2\text{O}$.

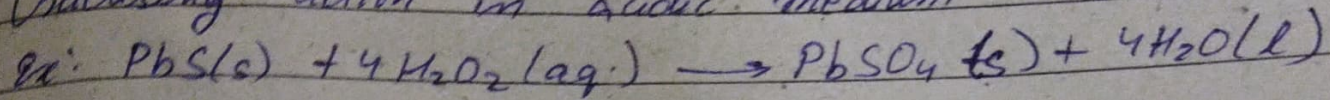
Structure: open book.



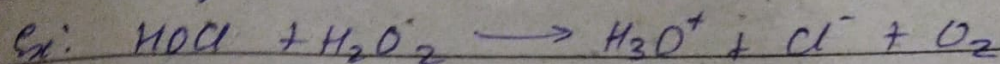
non-planar.

Chemical Properties

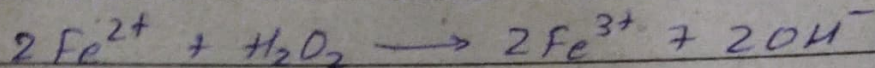
• Oxidising action in acidic medium



• Reducing action in acidic medium



• Oxidising action in basic medium



• Reducing action in basic medium

