

# QB365 Question Bank Software Study Materials

## Hydrogen Important 2 Marks Questions With Answers (Book Back and Creative)

11th Standard

Chemistry

Total Marks : 60

### 2 Marks

30 x 2 = 60

- 1) Discuss the three types of Covalent hydrides.

**Answer :** a) Electron-precise hydrides:

These have required number of electron to represent their conventional d lewis structure. All the elements of carbon group (14) form such hydrides.

Eg CH<sub>4</sub>, C<sub>2</sub>H<sub>6</sub>, SiH<sub>4</sub>, GeH<sub>4</sub>

b) Electron - deficient hydrides:

There act as Lewis acids (ie) electron acceptors. The elements from group (13) form such hydrides.

Eg: B<sub>2</sub>H<sub>6</sub>

c) Electron - rich hydrides:

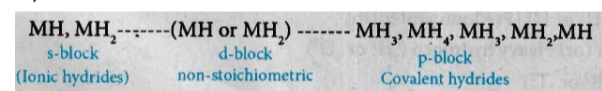
There have excess electron, which are present as lone pairs. Elements of group 15-17 form such hydrides. They behave as Lewis bases (ie) electron donors.

Eg: NH<sub>3</sub>, H<sub>2</sub>O, HF

- 2) Write the expected formulas for the hydrides of 4<sup>th</sup> period elements. What is the trend in the formulas? In what way the first two members of the series different from the others?

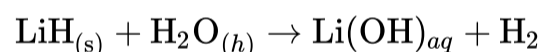
**Answer :** a) KH, CaH<sub>2</sub>, -----GaH<sub>3</sub>, GeH<sub>4</sub>, AsH<sub>3</sub>, H<sub>2</sub>Se, HBr

b) Trend in the formula:

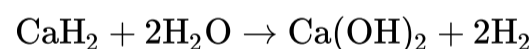


c) First 2 members: KH & CaH<sub>2</sub>. KH is alkali hydride (Grey powder) CaH<sub>2</sub> is an alkaline earth hydride.

KH reacts vigorously with water liberating H<sub>2</sub> gas.



CaH<sub>2</sub> reacts with water liberating H<sub>2</sub> gas



- 3) Do you think that heavy water can be used for drinking purposes?

**Answer :** Heavy water is toxic when taken in large quantities. Heavy water is not radioactive. The deuterium in it is stable; it does not decay. Nobody will be in danger at all from radiation. It is heavier than plain water. D<sub>2</sub>O perform little different from H<sub>2</sub>O in chemical reactions. One has to drink a lot of D<sub>2</sub>O to kill him.

- 4) An the cube at 0° C is placed in some liquid water at 0<sup>0</sup>C, the ice cube sinks - Why? What will happen to ice at 0<sup>0</sup>C placed in liquid water at 0<sup>0</sup>C?

**Answer :** NOTE:

At any condition ice cube does not sink in water.

At 0<sup>0</sup>C, ice and liquid water will be in equilibrium and will coexist. Hence no freezing or melting will occur.

- 5) Name the isotopes of hydrogen.

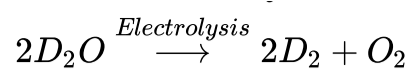
**Answer :** Protium, Deuterium or heavy hydrogen  ${}_1\text{H}^2$  or  ${}_1\text{D}^2$ , Tritium  ${}_1\text{H}^3$  or  ${}_1\text{T}^3$ .

- 6) What is ortho hydrogen ?

**Answer :** Hydrogen molecule in which protons in the nuclei of both H-atoms are known to spin in same direction is termed as ortho hydrogen.

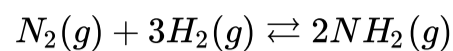
- 7) How is deuterium prepared from heavy water?

**Answer :** Electrolysis of heavy water gives deuterium.



- 8) Write a note on Haber's process.

**Answer :** The process of manufacture of ammonia is called Haber process, which is used for manufacturing nitric acid, fertilizers and explosives. Hydrogen combines with nitrogen in the ratio 3: 1 in presence of Fe as catalyst and Mo as promoter.



- 9) Life underneath frozen lakes survive even bitter winter. Justify.

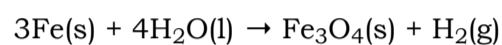
**Answer :** Unlike most liquids, water has a unique property of expanding when it freezes. This expansion allows life within water to survive the winter.

- 10) Why does water show high boiling point as compared to hydrogen sulphide? Give reasons for your answer.

**Answer :** Water has high boiling point due to strong intermolecular hydrogen bonding which is absent in hydrogen sulphide.

- 11) What happens when steam is passed over hot iron.

**Answer :** Steam when passed over hot iron gives iron oxide with the evolution of Hydrogen.



- 12) What causes hardness in water?

**Answer :** Water containing bicarbonates, sulphates and chlorides of calcium and magnesium is called hard water.

- 13) Ice floats on water. Give reason

**Answer :** Ice has highly ordered 3D hydrogen bonded structure in which oxygen atom is tetrahedrally surrounded by four hydrogen atoms. This gives ice a open cage like structure. Density of ice is less than water. So ice floats in water.

- 14) What is water gas? How is it produced?

**Answer :** Water gas is a mixture of carbon monoxide (CO) and hydrogen (H<sub>2</sub>), Steam is passed over a red-hot coke to produce carbon monoxide and hydrogen.

- 15) Give the reaction which takes place in H<sub>2</sub> - O<sub>2</sub> fuel cells.

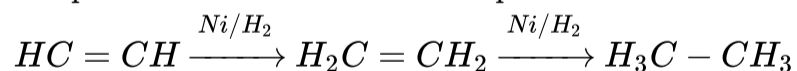
**Answer :**  $2H_2 + O_2 \rightarrow 2H_2O$ . This reaction is explosive and releases a lot of energy, which is used in fuel cells to generate electricity.

- 16) Mention the oxidation state of hydrogen in hydrides. Give three examples of reactive metal hydrides.

**Answer :** The oxidation state of hydrogen in hydrides it is -1.  
The reactive metal hydrides as LiH, NaH, CaH.

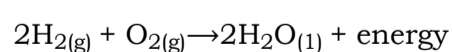
- 17) Show that hydrogen itself acts as a reducing agent.

**Answer :** Hydrogen itself acts as a reducing agent. In the presence of finely divided nickel, it adds to the unsaturated organic compounds to form saturated compounds.



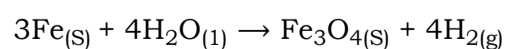
- 18) Why hydrogen gas is used as fuel?

**Answer :** Hydrogen burns in air, virtually free from pollution and produces significant amount of energy. This reaction is used in fuel cells to generate electricity



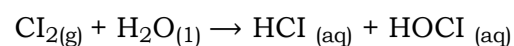
- 19) What happens when steam is passed over red hot iron?

**Answer :** When steam is passed over red hot iron, iron oxide will be formed with the release of hydrogen



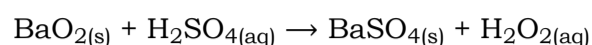
- 20) Explain the action of chlorine with water.

**Answer :** Chlorine reacts with the water to form hydrochloric acid and hypochlorous acid



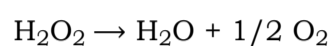
21) How would you prepare Hydrogen peroxide?

**Answer :** Hydrogen peroxide can be prepared by adding a metal peroxide to dilute acid



22)  $\text{H}_2\text{O}_2$  solutions are stored in plastic bottles only and not in glass bottles. Why ?

**Answer :** Hydrogen peroxide is highly unstable and the aqueous solution spontaneously disproportionates to give oxygen and water. The reaction is, however, slow but is explosive when catalyzed by metal. If it is stored in glass container, it dissolves the alkali metals from the glass, which catalyzes the disproportionation reaction. For this reason,  $\text{H}_2\text{O}_2$  solutions are stored in plastic bottles.



23) Ice is less dense than water at  $0^\circ\text{C}$ . Justify this statement.

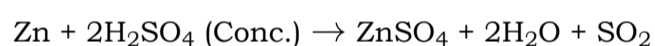
**Answer :** In ice, each oxygen atom is surrounded tetrahedrally by through hydrogen bonds to four water molecules. That is, the presence of two hydrogen atoms and two lone electron pairs (on oxygen) in each water molecule results in a three-dimensional structure. The arrangements creates an open structure, which in turn accounts for the fact that ice is less dense than water at  $0^\circ\text{C}$ .

24) What do you understand by the term 'non-stoichiometric hydrides'? Do you expect this type of hydrides to be formed by alkali metals? Justify your answer.

**Answer :** Those hydrides which do not have fixed composition are called non-stoichiometric hydrides, and the composition varies with temperature and pressure. This type of hydrides are formed by d and f-block elements. They cannot be formed by alkali metals because alkali metal hydrides form ionic hydrides.

25) Can we use concentrated sulphuric acid and pure zinc in the preparation of dihydrogen?

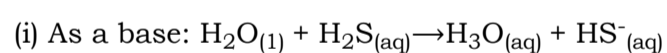
**Answer :** Conc.  $\text{H}_2\text{SO}_4$  cannot be used because it acts as an oxidizing agent also and gets reduced to  $\text{SO}_2$ .



Pure Zn is not used because it is non-porous and reaction will be slow. The impurities in Zn help in constitute of electrochemical couple and speed up reaction.

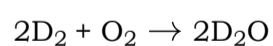
26) Write the chemical reactions to show the amphoteric nature of water.

**Answer :** Water is amphoteric in nature and it behaves both as an acid as well as base. With acids stronger than itself (e.g.,  $\text{H}_2\text{S}$ ) it behaves as a base and with bases stronger than itself (e.g.,  $\text{NH}_3$ ) it acts as an acid.

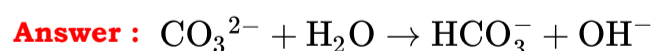


27) What is heavy water? How is it prepared?

**Answer :** Like hydrogen, deuterium also reacts with oxygen to form deuterium oxide called heavy water. It also reacts with halogen to give corresponding halides.



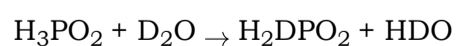
28) Solution of carbonates are slightly alkaline. Why?



alkaline

29) What is the action of  $\text{D}_2\text{O}$  and hypo-phosphorus acid?

**Answer :** When  $\text{D}_2\text{O}$  is treated with of hypo-phosphorus acid only one hydrogen atom is exchanged with deuterium. It indicates that, it is a monobasic acid.



30) What is the meaning of 100 - volume  $\text{H}_2\text{O}_2$  ?

**Answer :** A 30% solution of hydrogen peroxide is marketed as '100-volume' hydrogen peroxide indicating that at S.T.P., 100 ml of oxygen is liberated by 1 ml of this solution on heating.