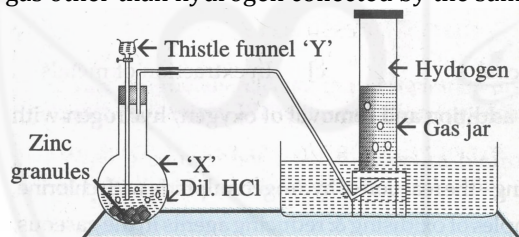


Q1. Select the correct answer from the symbols in brackets.

1. The element placed below hydrogen in group 1 [IA]. [Na, Li, K, F],
2. The element other than hydrogen, which forms a molecule containing a single covalent bond. [Cl, N, O]
3. The element, which like hydrogen has one valence electron. [He, Na, F, O]
4. The element, which like hydrogen is a strong reducing agent. [Pb, Na, S, Cl]
5. The element which forms a diatomic molecule. [C, Br, S, P]

Q2. The diagram represents the preparation & collection of hydrogen by a standard laboratory method.

1. State what is added through the thistle funnel 'Y'.
2. State what difference will be seen if pure zinc is added in the distillation flask 'X' instead of granulated zinc.
3. Name a solution which absorbs the impurity - H₂S.
4. State why hydrogen is collected after all the air in the apparatus is allowed to escape.
5. Name a gas other than hydrogen collected by the same method.



Q3. Answer the following

1. State the reactant added to hydrogen to obtain the respective product in each case.
 - (a) Ammonia
 - (b) Hydrogen chloride
 - (c) Water
 - (d) Hydrogen sulphide
2. How are the unreacted gases separated out in 'Bosch process' in the manufacture of hydrogen
3. Compare the combustibility of -
 - (a) pure hydrogen
 - (b) hydrogen-air mixture
4. Explain the terms - oxidation and reduction in terms of addition and removal of oxygen/hydrogen with suitable examples.
5. Explain the term redox reaction with an example involving the reaction of hydrogen sulphide with chlorine
6. State what are oxidising and reducing agents. Give examples of oxidising and reducing agents in the gaseous, liquid and solid form.

Q4. Select from A to G the reactant added, to give the products 1 to 5, in the preparation of hydrogen gas.

A : dilute acid

D : conc. alkali

G : steam

B : dilute alkali

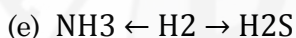
E : boiling water

C : cold water

F : conc. acid



Q5. Give balanced equations for the following conversions, 1 to 5.



Q6. Give reason for following

1. Nitric acid in the dilute form is not used in the laboratory preparation of hydrogen from metals.
2. Granulated zinc is preferred to metallic zinc in the preparation of hydrogen using dilute acid.
3. Hydrogen and alkali metals of group 1 [IA] react with copper [II] oxide to give copper.
4. Hydrogen is collected by the downward displacement of water and not air even though it is lighter than air.

Q7. Name the following

1. A metal below iron but above copper in the activity series of metals which has no reaction with water.
2. A metal which cannot be used for the preparation of hydrogen using dilute acids.
3. The salt formed when aluminium reacts with potassium hydroxide, during the preparation of hydrogen from alkalis.
4. A gaseous reducing agent which is basic in nature.
5. A compound formed between hydrogen and an element from group 17 [VIIA] - period 3.

Q8. Complete the following reactions

Reactions of metals - alkali [conc. soln.]

- Zinc $\text{Zn} + \text{NaOH} \rightarrow \dots + \dots$ [g]
- Zn + KOH $\dots + \dots$ [g]
- Lead $\text{Pb} + \text{NaOH} \rightarrow \dots + \dots$ [g]
- Aluminium $\text{Al} + \text{NaOH} + \text{H}_2\text{O} \rightarrow \dots + \dots$ [g]
- Al + KOH + H₂O $\rightarrow \dots + \dots$ [g]

Reactions of active metals - cold water

- Potassium $2\text{K} + 2\text{H}_2\text{O} \rightarrow 2\text{KOH} + \text{H}_2$ [g]
- Sodium $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$ [g]
- Calcium $\text{Ca} + 2\text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{H}_2$ [g]

Reaction of metals with steam

- Magnesium $\text{Mg} + \text{H}_2\text{O} \rightarrow \text{MgO} + \text{H}_2$ [g]
- Aluminium $2\text{Al} + 3\text{H}_2\text{O} \rightarrow \text{Al}_2\text{O}_3 + 3\text{H}_2$ [g]
- Zinc $\text{Zn} + \text{H}_2\text{O} \rightarrow \text{ZnO} + \text{H}_2$ [g]
- Iron $3\text{Fe} + 4\text{H}_2\text{O} \rightleftharpoons \text{Fe}_3\text{O}_4 + 4\text{H}_2$ [g]

Mcqs

1. Which of the following is also known as lightest gas?

- | | |
|-------------|------------------|
| 1. Nitrogen | 3. Carbondioxide |
| 2. Oxygen | 4. Hydrogen |

2. While preparation of the hydrogen in the laboratory why an airtight apparatus is used?

1. As granulated Zinc on reaction with dilute acids imparts traces of gaseous impurities.
2. As hydrogen forms an explosive mixture with air.
3. Both (a) and (b)
4. None of these

3. Hydrogen gas will be automatically collected with the help of a delivery tube via the downward displacement of water.

What is the correct reason behind that?

1. Hydrogen gas is lighter than water.
2. Water is lighter than hydrogen gas.
3. Hydrogen gas is lighter than HCl
4. HCl is lighter than hydrogen gas.

4. If the gas is _____ dense than air e.g. hydrogen or ammonia, the test tube must be inverted.

- | | |
|---------|------------------|
| 1. More | 3. No |
| 2. Less | 4. None of these |

5. The formation of water gas in the Bosch process is an _____.

- | | |
|------------------------|------------------------|
| 1. Exothermic process | 3. it is not a process |
| 2. Endothermic Process | 4. NA |

6. In the Bosch process of hydrogen preparation, which compound is used as a promoter?

- | | |
|--------------------|-------------------|
| 1. Ferric chloride | 3. Caustic alum |
| 2. Chromic oxide | 4. Carbon dioxide |

7. In the Bosch process, the steam is passed through coke at what temperature?

- | | |
|-------------|-------------|
| 1. 1,000° C | 3. 900° C |
| 2. 1,100° C | 4. 1,290° C |

8. Name the other product released along with hydrogen during the Bosch process.

- | | |
|-------------------|--------------------|
| 1. Carbon dioxide | 3. Carbon monoxide |
| 2. Oxygen | 4. Ferrous oxide |

9. In the Bosch process, the end product is passed through ___ to separate carbon monoxide.

1. ammoniacal cuprous phosphate
2. ammoniacal sulfur chloride
3. ammoniacal cuprous chloride
4. ammoniacal cuprous bromate

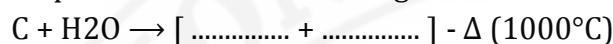
10. The laboratory preparation of hydrogen gas involves which of the following elements?

1. Dilute sulphuric acid or Dilute hydrochloric acid on zinc granules
2. Dilute nitrous acid on Zinc granules
3. Phosphoric acid or dilute hydrochloric acid on zinc granules
4. Sulphuric acid or Hydrochloric acid on zinc granules

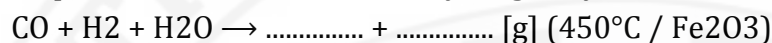
➤ Complete the following reactions

1.Preparation of hydrogen [Industrial method - Bosch process]

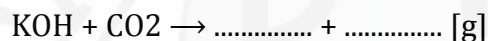
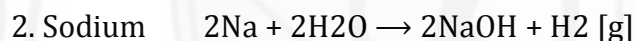
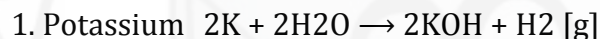
Step I - Production of water gas



Step II - Reduction of steam to hydrogen by carbon monoxide



Step III - Removal of unreacted carbon dioxide and carbon monoxide from the above mixture

**Reactions of active metals - cold water****Answer the following**1. What do the following symbols [or formula] denote : 2H ; H₂ ; H⁺. [two atoms, molecule, ion]2. Write correctly balanced equation for the following 'word equation' :
calcium + water → calcium hydroxide + hydrogen

3. When steam is passed over red-hot iron, magnetic oxide of iron and hydrogen are obtained. 'The reaction between steam and red-hot iron is a Reversible Reaction'. What is meant by this statement.

4. Explain the following :

Two jars of H₂ are collected – 'one burns quietly and the other does not'.

5. Describe one chemical test applied to the following gases, which would enable you to distinguish between them : 'carbon monoxide and hydrogen'.

6.Explain briefly how hydrogen is manufactured on a large scale, from steam.

7.What do you observe when a piece of sodium is dropped into cold water ?

8.How would you obtain 'hydrogen from sodium hydroxide' solution other than by electrolysis ?

9.Place the metals calcium, iron, magnesium and sodium in order of their activity with water, placing the most active first. Write the equation for each of the above metals which react with Water.

10.State the electronic configuration of hydrogen [at. no. 1]. Give a reason why hydrogen can be placed in group 1 [1A] and group 17 [VIIA] of the periodic table