

HYDROGEN SOLVED QUESTIONS

1. Multiple choice questions: (Tick the correct option).
 1. Name the metal which does not react with dilute sulphuric acid.
(a) Lead (b) Tin (c) Magnesium (d) Iron
 2. In which list are the metals correctly arranged in the order of their increasing reactivity with water?
(a) Magnesium, potassium, sodium, calcium, iron
(b) Potassium, sodium, calcium, magnesium, iron
(c) Magnesium, sodium, calcium, potassium, iron
(d) Iron, magnesium, calcium, sodium, potassium
 3. The credit for the discovery of hydrogen goes to
(a) Lavoisier (b) Robert Boyle
(c) Henry Cavendish (d) Francis Bacon
 4. In the free state, hydrogen is present in
(a) natural gas (b) sun
(c) petroleum (d) mineral salts
 5. Hydrogen burns in oxygen to form
(a) hydrochloric acid (b) water
(c) hydrogen sulphide (d) ammonia
 6. The process of removing oxygen from their compounds is called
(a) reduction (b) combination
(c) synthesis (d) oxidation
 7. Hydrogen frees metals from their
(a) sulphates (b) oxides
(c) nitrates (d) none of the above
 8. When hydrogen gas is bubbled through a soap solution, soap bubbles filled with hydrogen begin to fly away. This experiment demonstrates that
(a) hydrogen is denser than air
(b) hydrogen is less dense than air
(c) hydrogen is the lightest gas
(d) hydrogen in the bubble is attracted by the air above it.
 9. The lightest element known is
(a) helium (b) lithium (c) hydrogen (d) radium
 10. Petrol and paraffin wax are
(a) hydrocarbons (b) acids
(c) bases (d) salts

1. (a) 2. (d) 3. (c) 4. (b) 5. (b) 6. (a) 7. (b) 8. (b) 9. (c) 10. (a)

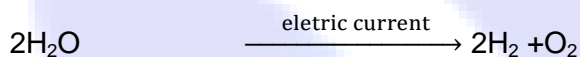
2. Fill in the blanks with appropriate words.

1. An atom of hydrogen contains one proton and electron/s.
2. The reaction of iron with dilute hydrochloric acid produces as the salt of iron along with hydrogen gas as the products of the reaction.
3. Ammonia gas is highly soluble in water while hydrogen gas is in water.
4. Sulphur dioxide is an acidic gas while hydrogen is a gas.
5. volumes of hydrogen react with one volume of nitrogen under suitable conditions to give ammonia gas.

3. Write balanced chemical equations for the following reactions.

1. Water to two neutral gases as the only products.

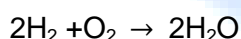
Ans.



(Acidulated water)

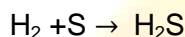
2. Hydrogen to water using a neutral gas.

Ans.



3. Hydrogen to hydrogen sulphide using a non-metal.

Ans.



4. Give reasons for the following

1. Hydrogen is used in the oxy-hydrogen flame for welding and cutting of strong metals but nitrogen is not used for the same.

Ans.

Hydrogen is a combustible gas and oxygen is a supporter of combustion. Thus, oxy-hydrogen flame produces a temperature of about 2800°C at which the metal melts, enabling it to be cut and welded. Nitrogen is a non-combustible gas and a mixture of nitrogen and hydrogen will not burn to produce a flame.

2. Zinc reacts with dilute sulphuric acid to give zinc sulphate and hydrogen but copper does not react with the same.

Ans.

A metal which lies above hydrogen in the metal activity series can displace hydrogen from dilute acids but a metal which lies below hydrogen does not. Thus, zinc which lies above hydrogen in the metal activity series displaces hydrogen from dilute sulphuric acid but copper which lies below hydrogen does not react with the acid.

3. We see a flame on the surface of water, when sodium is made to react with it.

Ans.

Sodium reacts violently with water and the hydrogen evolved immediately catches fire.

Therefore, we see a flame on the surface of water when sodium is made to react with it

4. Why can hydrogen be used as a fuel?

Ans.

Hydrogen is used as a fuel because of its high heat of combustion. Moreover, hydrogen is a pollution free fuel.

5. What are the physical properties of hydrogen?

Ans.

(i) Hydrogen is a colourless, odourless and tasteless gas.

(ii) It is neutral towards litmus and non-poisonous.

(iii) It is lighter than air and slightly soluble in water.

6. Why is dilute H_2SO_4 added to water during electrolysis?

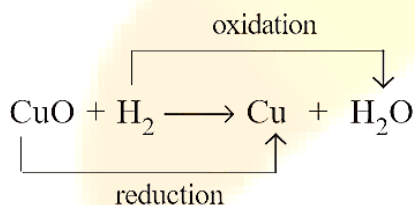
Ans.

Distilled water (used during electrolysis) is a non-conductor of electricity. When dilute H_2SO_4 is added to water, it dissociates into ions. This makes it conducting and therefore, electrolysis can be carried out.

7. Explain oxidation and reduction reactions with the help of a chemical equation.

Ans

In the reaction,



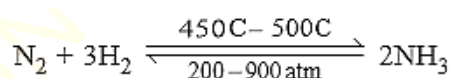
reduction Oxygen is removed from copper oxide by hydrogen and thus, it is a reduction reaction.

Oxygen is added to hydrogen and thus, it is an oxidation reaction.

8. State the conditions under which Haber's process proceeds and the reactants and the products formed.

Ans.

When a mixture of hydrogen and nitrogen in the ratio 3:1 are passed over finely divided iron at 450°C to 500°C , at a pressure of 200–900 atmosphere, ammonia is produced. This is Haber's process.



9. How can you prove that hydrogen burns in air to produce water?

Ans.

Hydrogen, produced by the action of dilute sulphuric acid on zinc, is passed through anhydrous calcium chloride and then lighted at the end of a jet. Water droplets are produced which condense on the cold surface of a flask. The droplets are tested with anhydrous cobalt chloride which turns pink.

10. How can you prove that water contains two volumes of hydrogen and one volume of oxygen?

Ans.

When acidulated water is electrolysed using platinum electrodes, water dissociates into hydrogen and oxygen. The ratio of hydrogen collected at the cathode is twice the volume of oxygen collected at the anode.