Question Bank: Hydrogen - 50 Marks

Section A: Short Questions (2 marks each - Total 10 marks)

1. Justify the position of hydrogen in the periodic table.

2. Name the impurities present in hydrogen prepared in the laboratory. How can these impurities be removed?

3. Define isotopes and mention one pair of isotopes of hydrogen.

4. Explain the term 'hydronium ion.'

5. Differentiate between atomic hydrogen and nascent hydrogen.

**Section B: Multiple Choice Questions (1 mark each - Total 5 marks)**

6. Thin strips of magnesium, copper, and iron are taken. What happens when these metals are heated in the presence of air?

a) Formation of oxides

b) Liberation of hydrogen

c) Formation of chlorides

d) No reaction

7. What is the result when magnesium is heated with dilute HCl?

a) Formation of magnesium oxide

b) Formation of magnesium chloride and hydrogen gas

c) No reaction

d) Formation of magnesium sulphate

8. When magnesium is added to an aqueous solution of zinc sulphate, what occurs?

a) Formation of zinc oxide

b) Formation of zinc chloride

c) No reaction

d) Liberation of hydrogen gas

9. Arrange the metals (magnesium, copper, iron) in descending order of reactivity.

**Section C: Long Questions (5 marks each - Total 25 marks)**

10. Discuss the preparation methods of hydrogen in the laboratory. Explain any two methods in detail.

11. Elaborate on the uses of hydrogen gas in various industries. Provide examples and discuss the significance.

12. Describe the properties of dihydrogen with respect to its physical and chemical characteristics.

13. Explain the role of hydrogen as a reducing agent in chemical reactions. Provide suitable examples.

14. Balance the following chemical equations:

a) H2 + O2 🡪 H2O

c) NH3 + O2 🡪 NO + H2O

b) Zn + HCl2 🡪 ZnCl2 + H2

**Section D: One-word Answers (1 mark each - Total 5 marks)**

15. What is the chemical symbol of hydrogen?

16. Name the method used to prepare hydrogen gas in the laboratory.

17. State one property of hydrogen that distinguishes it from other elements.

18. What is the product formed when hydrogen reacts with oxygen?

19. Identify the type of reaction when hydrogen reacts with chlorine.

**Answers**

**Section A: Short Questions (2 marks each - Total 10 marks)**

1. Justify the position of hydrogen in the periodic table.

- Answer: Hydrogen is placed in Group 1 of the periodic table due to its electronic configuration and shares similarities with alkali metals.

2. Name the impurities present in hydrogen prepared in the laboratory. How can these impurities be removed?

- Answer: Common impurities are water vapor, hydrocarbons, and oxygen. These can be removed by passing hydrogen through a drying agent, purifying catalyst, and by displacement reactions.

3. Define isotopes and mention one pair of isotopes of hydrogen.

- Answer: Isotopes are atoms with the same number of protons but different numbers of neutrons. One pair of hydrogen isotopes is protium (1H) and deuterium (2H).

4. Explain the term 'hydronium ion.'

- Answer: The hydronium ion H3O­­+­ is formed when a water molecule accepts a proton (H⁺) in an aqueous solution.

5. Differentiate between atomic hydrogen and nascent hydrogen.

- Answer: Atomic hydrogen H is a single hydrogen atom, while nascent hydrogen refers to hydrogen in its nascent or freshly produced state.

**Section B: Multiple Choice Questions (1/2 mark each - Total 5 marks)**

6. Thin strips of magnesium, copper, and iron are taken. What happens when these metals are heated in the presence of air?

- Answer: b) Liberation of hydrogen

7. What is the result when magnesium is heated with dilute HCl?

- Answer: b) Formation of magnesium chloride and hydrogen gas

8. When magnesium is added to an aqueous solution of zinc sulphate, what occurs?

- Answer: d) Liberation of hydrogen gas

9. Arrange the metals (magnesium, copper, iron) in descending order of reactivity.

- Answer: Magnesium > Iron > Copper

**Section C: Long Questions (5 marks each - Total 25 marks)**

10. Discuss the preparation methods of hydrogen in the laboratory. Explain any two methods in detail.

- Answer: [Provide relevant details about laboratory methods for hydrogen preparation.]

11. Elaborate on the uses of hydrogen gas in various industries. Provide examples and discuss the significance.

- Answer: [Provide detailed information on industrial applications of hydrogen.]

12. Describe the properties of dihydrogen with respect to its physical and chemical characteristics.

- Answer: [Provide details on physical and chemical properties of dihydrogen.]

13. Explain the role of hydrogen as a reducing agent in chemical reactions. Provide suitable examples.

- Answer: [Discuss hydrogen's role in reduction reactions and provide examples.]

**Section D: One-word Answers (1 mark each - Total 5 marks)**

15. What is the chemical symbol of hydrogen?

- Answer: H

16. Name the method used to prepare hydrogen gas in the laboratory.

- Answer: Laboratory method

17. State one property of hydrogen that distinguishes it from other elements.

- Answer: Diatomic molecule

18. What is the product formed when hydrogen reacts with oxygen?

- Answer: Water (\(H\_2O\))

19. Identify the type of reaction when hydrogen reacts with chlorine.

- Answer: Combination or synthesis reaction

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