INORGANIC CHEMISTRY TIME :30 Min

SECTION–I(i) : (Maximum Marks : 36)

- This section contains **12** questions.
- Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is correct.
- For each question, darken the bubble corresponding to the correct option in the ORS.
- For each question, marks will be awarded in one of the following categories :

Full Marks : +3 If only the bubble corresponding to the correct option is darkened.
Zero Marks : 0 If none of the bubbles is darkened.
Negative Marks : –1 In all other cases

1. $BaO_2 + H_2SO_4 \rightarrow BaSO_4 + H_2O_2$

In the above method of preparation of H_2O_2, now-a-days H_3PO_4(conc.) is used instead of conc. H_2SO_4. Because -

(A) H_2SO_4 catalyses the backward reaction

(B) H_2SO_4 catalyses the decomposition of H_2O_2

(C) H_3PO_4 catalyses the backward reaction

(D) None of these

2. Which of the following statement is **CORRECT** about H_2O_2

(A) H_2O_2 is used in detection of Cr^{+3} and Ti^{+4} ion (B) H_2O_2 is used as a rocket propellant

(C) H_2O_2 is a odourless liquid (D) All are correct

3. Which of the following pair of reagents can be used for producing hydrogen gas?

(I) Zn + dil. H_2SO_4 (II) Zn + NaOH (III) Al + HCl (g) (IV) Al + NaOH

(A) I, II and III only (B) II, III and IV only

(C) I, III and IV only (D) I, II, III and IV

4. Which of the following methods are used for removal of temporary hardness only :-

(A) Boiling (B) Clark's (C) Zeolite (D) Both (A) and (B)

5. In which of the following reaction H_2O_2 an act as reducing agent.

(A) $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$

(B) $2[Fe(CN)_6]^{3-} + 2OH^- + H_2O_2 \rightarrow 2[Fe(CN)_6]^{4-} + 2H_2O + O_2$

(C) $CrO_4^{2-} + 2H^+ + 2H_2O_2 \xrightarrow[\text{solvent}]{\text{organic}}$

$$\underset{\text{Blue}}{CrO_5}\downarrow + 3H_2O$$

(D) $H_2S + H_2O_2 \rightarrow S\downarrow + 2H_2O$

6. Chemical (A) is used for water softening to remove temporary hardness. (A) reacts with sodium carbonate to generate caustic soda. When CO_2 is bubbled through (A), it turns cloudy. What is the chemical composition of (A).

(A) $CaCO_3$ (B) CaO (C) $Ca(OH)_2$ (D) $Ca(HCO_3)_2$

7. Which of the following statement is correct for H_2O_2?

(A) H_2O_2 has acidic property (B) H_2O_2 may act as oxidising agent

(C) H_2O_2 may act as reducing agent (D) All are correct

8. Pure de-mineralised water can be obtained by.

(A) Na^+ cation exchanger and Cl^- anion exchanger

(B) H^+ cation exchanger only

(C) H^+ cation exchanger and OH^- anion exchanger

(D) Na^+ cation exchanger only

9. Which of the following order is incorrect ?

(A) $H_2 < D_2 < T_2$ (Number of protons) (B) $H_2 < D_2 < T_2$ (Bond energy)

(C) $H_2 < D_2 < T_2$ (Boiling point) (D) $H_2 < D_2 < T_2$ (No. of neutrons)

10. Which of the following process does not remove permanent hardness :

(A) Permutit process (B) Synthetic resins method

(C) Clark's method (D) Calgon's method

11. Which of the following process is used to prepare H_2O_2 by :-

(A) Oxidation of 2-ethylanthraquinon by O_2

(B) Oxidation of 2-ethylanthraquinol by O_2

(C) Reaction of 2-ethylanthraquinol by H_2O

(D) Reduction of 2-ethylanthraquinol by H_2

12. In a sample of temporary hard water which of the following water softening process does **NOT** produced any precipitate of cation responsible for hardness?

(A) Boiling of water

(B) Addition of lime water

(C) Addition of sodium hexameta phosphate

(D) Addition of sodium carbonate

SECTION-I(ii) : (Maximum Marks: 20)

- This section contains **FIVE** questions.
- Each question has **FOUR** options for correct answer(s). **ONE OR MORE THAN ONE** of these four option(s) is (are) correct option(s).
- For each question, choose the correct option(s) to answer the question.
- Answer to each question will be evaluated according to the following marking scheme:

Full Marks	: +4	If only (all) the correct option(s) is (are) chosen.
Partial Marks	: +3	If all the four options are correct but ONLY three options are chosen.
Partial Marks	: +2	If three or more options are correct but ONLY two options are chosen, both of which are correct options.
Partial Marks	: +1	If two or more options are correct but ONLY one option is chosen and it is a correct option.
Zero Marks	: 0	If none of the options is chosen (i.e. the question is unanswered).
Negative Marks	: –2	In all other cases.

13. In acidic medium the reaction of H_2O_2 with potassium permanganate produces a compound in which the oxidation state of Mn is not.

(A) 0 (B) +2 (C) +3 (D) +4

14. The compound which give H_2O_2 on treatment with dilute acid is/are :

(A) PbO_2 (B) MnO_2 (C) Na_2O_2 (D) BaO_2

15. Hydrogen can be obtained by

(A) Zn + dil. H_2SO_4 (B) Zn + conc. HCl (C) Zn + dil. HNO_3 (D) Mg + H_2O (hot)

16. Ortho-hydrogen and para-hydrogen resembles in which of the following property :-

(A) Thermal conductivity (B) Magnetic properties

(C) Chemical properties (D) Heat capacity

17. HD gas is prepared by :-

(A) Reaction of D_2O with NaH (B) Reaction of H_2O with NaD

(C) Electrolysis of D_2O (D) Na_2O_2 with D_2O

SECTION–I(iii) : (Maximum Marks : 9)

- This section contains **ONE** paragraph.
- Based on each paragraph, there are **THREE** questions.
- Each question has **FOUR** options (A), (B), (C) and (D) **ONLY ONE** of these four options is correct.
- For each question, darken the bubble corresponding to the correct option in the ORS.
- For each question, marks will be awarded in one of the following categories :

Full Marks : +3 If only the bubble corresponding to the correct answer is darkened.

Zero Marks : 0 In all other cases.

Passage for Q.18 to Q.20

Hydrogen accounts for approximately 75% of the mass of the universe. Hydrogen serves as the nuclear fuel of our Sun and other stars, and these are mainly composed of hydrogen. Hydrogen has three isotopes : hydrogen or protium (^1_1H), deuterium or heavy hydrogen (D or ^2_1H), tritium (T or ^3_1H).

18. Which of the following is radioactive in nature ?

(A) hydrogen only (B) deuterium only

(C) tritium only (D) deuterium and tritium

19. Hydrogen, H_2, is very less abundant in the atmosphere due to -

(A) inflammable nature of H_2

(B) weak earth's gravity which is not able to hold light H_2 molecules

(C) diatomic nature of hydrogen

(D) very rapid reaction between hydrogen and atmospheric oxygen

20. Liquid H_2 has been used as rocket fuel as

(A) its reaction with oxygen is highly exothermic

(B) it occupies small space

(C) it has high thrust

(D) all of the above