Bhavan's Tripura Vidyamandir

1st Periodic Assessment: (2024-2025)

Class:- 12 **Subject:- Chemistry**

Time:- 2 Hours Total :- 50 Marks

Name of the student : Roll Section

General Instructions:

Read the following instructions carefully.

a) There are 31 questions in this question paper with internal choice.
b) SECTION A consists of 20 questions carrying 1 mark each.
c) SECTION B consists of 5 short answer questions carrying 2 marks each.
d) SECTION C consists of 5 short answer questions carrying 3 marks each.
e) SECTION D consists of 1 long answer questions carrying 5 marks each.
g) All questions are compulsory.
h) Use of log tables and calculators are not allowed.

SECTION -A

1. Which of the following units is useful in relating concentration of solution with its vapour pressure?
   (a) Mole fraction
   (b) Parts per million
   (c) Mass percentage
   (d) Molality
2. The law which indicates the relationship between solubility of a gas in liquid and pressure is
   (a) Raoult's law
   (b) Henry's law
   (c) Lowering of vapour pressure
   (d) Van't Hoff law
3. The osmotic pressure of a solution can be increased by
   (a) increasing the volume
   (b) increasing the number of solute molecules
   (c) decreasing the temperature
   (d) removing semipermeable membrane
4. The emf of the cell:
Ni | Ni^{2+} (1.0 M) || Au^{3+} (1.0 M) | Au (E° = -0.25 V for $Ni^{2+}|Ni$; E° = 1.5 V for $Au^{3+}|Au$) is
   (a) 1.25 V
   (b) -1.25 V
   (c) 1.75 V
   (d) 2.0 V
5. Ionic mobility of Ag+ is:
($\lambda_{Ag^+} = 5 \times 10^{-4}$ ohm^{-1} cm^2 eq^{-1}] is
   (a) 5.2×10^{-9}
   (b) 2.4×10^{-9}
   (c) 1.52×10^{-9}
   (d) 8.25×10^{-9}
6. Which of the following has magnetic moment value of 5.9?
   (a) Fe^{2+} (b) Fe^{3+}
   (c) Ni^{2+} (d) Cu^{2+}

7. Nucleophilicity order is correctly represented by

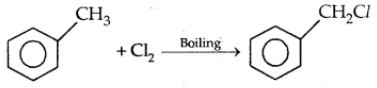
(a) $CH_3^- < \overline{N}H_2 < H\overline{O} < F^-$

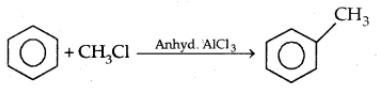
(b) $CH_3^- \simeq N\overline{H}_2 > OH^- \simeq \overline{F}$

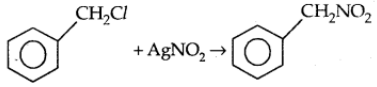
(c) $CH_3^- > \overline{N}H_2 > H\overline{O} > F^-$

(d) $NH_2^- > \overline{F} > HO^- > CH_3^-$

8. Which of the following is a free radical substitution reaction?

(a) 

(b) 

(c) 

(d) $CH_3CHO + HCN \rightarrow CH_3CH(OH)CN$

9. In a dry cell, which of the following is the electrolyte?
   (a) Potassium hydroxide
   (b) Sulphuric acid
   (c) Ammonium chloride
   (d) Manganese dioxide

10. The process of transmitting electric current through an electrolyte's solution to decompose it is known as _____
   (a) Electrolyte
   (b) Electrode
   (c) Electrolysis
   (d) Electrochemical cell

10. The reaction, $3ClO^-(aq) \rightarrow ClO_3(aq) + 2Cl^-(aq)$ is an example of
   (a) Oxidation reaction
   (b) Reduction reaction
   (c) Disproportionation reaction
   (d) Decomposition reaction

12. The standard reduction potentials of X, Y, Z metals are 0.52, -3.03, -1.18 respectively. The order of reducing power of the corresponding metals is:
   (a) Y > Z > X
   (b) X > Y > Z
   (c) Z > Y > X
   (d) Z > X > Y

13. Which of the following is not a lanthanide property?
   a) They are soft metals with a white silvery colour
   b) They tarnish rapidly by air
   c) The hardness of the metals increases with increase in the atomic number
   d) The melting point of the metal ranges from 500-1000K

14. What is the lanthanide's final element?
    a) Ytterbium
    b) Erbium
    c) Thulium
    d) Lutetium

15. Which sequence should isomeric dichlorobenzenes be boiled in?
    a) para>ortho>meta
    b) meta>ortho>para
    c) ortho>meta>para
    d) para>meta>ortho

16. Which of the following statements about the interaction between C_2H_4 and Cl_2 in CCl_4 is incorrect?
    a) It results in the formation of a vicinal dihalide
    b) It results in the discharge of a reddish-brown colour
    c) It results in the formation of a colourless compound
    d) It results in the breaking of the C-C double bond

Directions: These questions (Q.NO 17, 18, 19,& 20) consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following four responses.

(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect.

17. Assertion : Molarity of a solution in liquid state changes with temperature.
    Reason : The volume of a solution changes with change in temperature.
18. Assertion : Alkylbenzene is not prepared by Friedel-Crafts alkylation of benzene.
    Reason : Alkyl halides are less reactive than acyl halides.
19. Assertion: conductivity decreases with dilution
    Reason: the number of ions per unit volume decreases on dilution.
20. Assertion: d-block elements are called transition metals
    Reason : f-block elements are inner-transition metals.

SECTION – B

21. State the Raoult's law of relative lowering of vapour pressure. Write its mathematical form. (1+1=2)
22. What is the Van't Hoff law of osmotic pressure. Write its mathematical form. (1+1=2)
23. How much charge is required for the following reductions:
    (a) 1 mol of Al^{3+} to Al?
    (b) 1 mol of Cu^{2+} to Cu ? (1+1=2)
24. Indicate the steps in the preparation of :
    $K_2Cr_2O_7$ from chromite ore.

Or, Write the mechanism of the following reaction:

$$n\text{-BuBr} + KCN \xrightarrow{EtOH-H_2O} n\text{-BuCN}$$

25. Write short note on Swarts reaction.

SECTION – C

26. A solution containing 30g of non-volatile solute exactly in 90 g of water has a vapour pressure of 2.8 kPa at 298 K. Further, 18g of water is then added to the solution and the new of vapour pressure becomes 2.9 k Pa at 298 K. Calculate
    (i) molar mass of the solute.
    (ii) vapour pressure of water at 298 K.
27. Calculate the standard cell potentials of the galvanic cells in which the following reactions take place.

    (a) $2Cr\ (s) + 3Cd^{2+}(aq) \longrightarrow 2Cr^{3+}(aq) + 3Cd\ (s)$

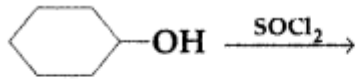
    Given $E^{\circ}_{Cr^{3+}/Cr} = -0{\cdot}74\ V$; $E^{\circ}_{Cd^{2+}/Cd} = -0{\cdot}40\ V$

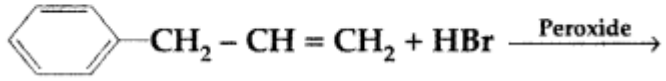
    (b) $Fe^{2+}(aq) + Ag^{+}(aq) \longrightarrow Fe^{3+}(aq) + Ag\ (s)$

    Given $E^{\circ}_{Ag^{+}/Ag} = 0{\cdot}80\ V$; $E^{\circ}_{Fe^{3+}/Fe^{2+}} = 0{\cdot}77\ V$

Or, Define conductivity and molar conductivity for the solution of an electrolyte. Discuss their variation with concentration. (1+1+1=3)

28. (a) Calculate the 'spin only' magnetic moment of $M^{2+}(aq)$ ion (Z = 27).
    (b) Write down the electronic configuration of (i) Cr (2+1=3)
29. Explain why
    (i) the dipole moment of chlorobenzene is lower than that of cyclohexyl chloride?
    (ii) alkyl halides, though polar, are immiscible with water? (1.5+1.5=3)
30. Draw the structure of major monohalo product in each of the following reactions :

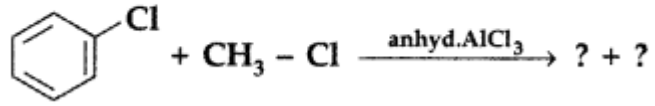
    (i) 

    (ii) 

(1.5+1.5=3)

Or, Write the product of the following reactions:

(i) $CH_3 - Cl + KCN \rightarrow ?$

(ii) 

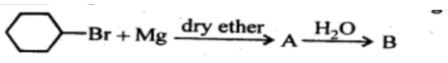
(1.5+1.5=3)

SECTION - D

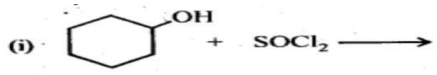
31. (a)Suggest two materials other than hydrogen that can be used as fuels in the fuel cells.
(b) Write the Nernst equation and emf of the following cells at 298 K:

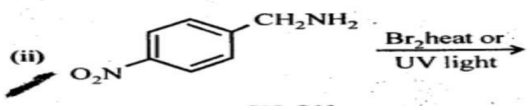
$Mg(s) \mid Mg^{2+}(0 \cdot 001\ M) \parallel Cu^{2+}(0 \cdot 0001\ M) \mid Cu(s)$

(c) write one method for the prevention of corrosion. (1+3+1=5)

Or, (a) Identify A and B. 

(b)

(i) 

(ii) 

(c) Write structure of the following compound:
2-Chloro-3-methylpentane (2+2+1=5)