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DMC

SECTION - B

Q. 9. Account for the following: 2 marks

- (i) Schottky defects lower the density of related solids.
- (ii) Conductivity of silicon increases on doping it with phosphorus.

Q. 10. Aluminum crystallizes in an fcc structure. Atomic radius of the metal is 125 pm. What is the length of the side of the unit cell of metal? 2 marks

Q. 11. Calculate the equilibrium constant, K for the reaction at 298 K, $Zn(s) + Cu^{2+}(aq) \rightleftharpoons Zn^{2+}(aq) + Cu(s)$ Given: $E_{Zn^{2+}/Zn}^0 = -0.76 V$ $E_{Cu^{2+}/Cu}^0 = +0.34 V$. 2 marks

Q. 12. (a) For a reaction $A + B \rightarrow P$, the rate law is given by, $r = k[A]^{1/2}[B]^2$ What is the order of this reaction.

(b) A first order reaction is found to have a rate constant $k = 5.5 \times 10^{-14} S^{-1}$ Find the half-life of the reaction. 2 marks

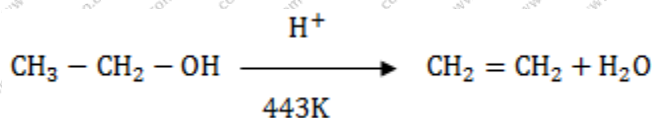
Q. 13. (a) Name the method used for removing gangue for sulphide ores.
(b) How is wrought iron different from steel. 2 marks

Q. 14. Draw the structures of the following molecules:

- (i) $XeOF_4$
- (ii) H_3PO_3

Q. 15. How are interhalogen compounds formed? What general compositions can be assigned to them? 2 marks

Q. 16. Explain the mechanism of the following reaction: 2 marks



Q. 17. Write the equation involved in the following reactions: 2 marks

- (i) Reimer - Tiemann reaction
- (ii) Williamson's ether synthesis

Q. 18. Define thermoplastic and thermosetting polymers. Give one example of each. 2 marks

OR

What is a biodegradable polymer? Give an example of a biodegradable aliphatic polyester.

SECTION - C

Q. 19. The rate of a reaction becomes four times when the temperature changes from 293 K to 313 K. Calculate the energy of activation (E_a) of the reaction assuming that it does not change with temperature. [$R = 8.314 JK^{-1} mol^{-1}$, $\log 4 = 0.6021$]. 3 marks

Q. 20. What are the characteristics of the following colloids? Give one example of each. 3 marks

- (i) Multimolecular colloids
- (ii) Lyophobic sols
- (iii) Emulsions

Q. 21. Give reasons for the following:

- (i) Where R is an alkyl group, $R_3P = O$ exists but $R_3N = O$ does not
- (ii) $PbCl_4$ is more covalent than $PbCl_2$
- (iii) At room temperature, N_2 is much less reactive. 3 marks

Q. 22. For the complex $[NiCl_4]^{2-}$, write . 3 mark

- (i) the IUPAC name.
- (ii) the hybridization type.
- (iii) the shape of the complex. (Atomic no. of Ni = 28)

OR

What is meant by crystal field splitting energy? On the basis of crystal field theory, write the electronic configuration of d^4 terms of t_{2g} and e_g in an octahedral field when

- (i) $\Delta_0 > P$
- (ii) $\Delta_0 < P$

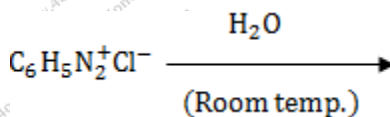
Q. 23. Give reasons for the following: 3 marks

- (i) Ethyl iodide undergoes S_N2 reaction faster than ethyl bromide.
- (ii) (\pm)-2-Butanol is optically inactive.
- (iii) C-X bond length in halobenzene is smaller than C-X bond length in $CH_3 - X$.

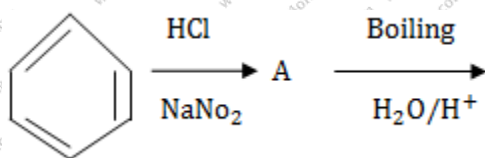
Q. 24. Complete the following reactions: 3 marks



(II)



(III)



Q. 25. (i) What class of drug is Ranitidine.

(ii) If water contains dissolved Ca^{2+} ions, out of soaps and synthetic detergents, which will you use for cleaning clothes.

(iii) Which of the following is an antiseptic. 0.2% phenol, 1% phenol. 3 marks

Q. 26. Calculate the emf of the following cell at. 3 marks

$25^\circ C: Ag(s) | Ag^+(10^{-3} M) || Cu^{2+}(10^{-1} M) | Cu(s)$ Give

$$E^0_{cell} = -0.46 V \text{ and } \log 10^n = n$$

Q. 27. Shanti, a domestic helper of Mrs. Anuradha, fainted while mopping the floor. Mrs. Anuradha immediately took her to the nearby hospital where she was diagnosed to be severely 'anemic'. The doctor prescribed an iron rich diet and multivitamins supplement to her. Mrs. Anuradha supported her financially to get the medicines. After a month, Shanti was diagnosed to be normal. After reading the above passage, answer the following question.

- What values are displayed by Mrs. Anuradha?
- Name the vitamin whose deficiency causes 'pernicious anemia'.
- Give an example of a water soluble vitamin. 3 marks

SECTION - D

Q. 28. (a) State Raoult's law for a solution containing volatile components. How does Raoult's law become a special case of Henry's law. 5 marks

(b) 1.00 g of a non-electrolyte solute dissolved in 50 g of benzene lowered the freezing point of benzene by 0.40 K. Find the molar mass of the solute. (K_f for benzene = 5.12 kg mol^{-1}).

Or

(a) Define the following terms:

- (i) Ideal solution
- (ii) Azeotrope
- (iii) Osmotic pressure

(b) A solution of glucose ($C_6H_{12}O_6$) in water is labelled as 10% by weight. What would be the molality of the solution? (Molar mass of glucose = 180 g mol^{-1})

Q. 29. (a) Give reasons for the following: 5 marks

- (i) Mn^{3+} is a good oxidising agent.
- (ii) $E_{M^{2+}/M}^0$ value is not regular for first row transition metals (3d series).
- (iii) Although 'F' is more electronegative than 'O', the highest Mn fluoride is MnF_4 , whereas the highest oxide is Mn_2O_7 .

(b) Complete the following equations:

- (i) $2CrO_4^{2-} + 2H^+ \rightarrow$
- (ii) $2KMnO_4 \xrightarrow{\text{Heat}}$

OR

(a) Why do transition elements show variable oxidation state.

- (i). Name the element showing maximum number of oxidation states among the first series of transition metals from Sc ($Z = 21$) to Zn ($Z = 30$).
- (ii) Name the element which shows only + 3 oxidation state.

(b) What is lanthanoid contraction? Name an important alloy which contains some of the lanthanoid metals.

Q. 30. (a) How will you convert the following: 5 marks

- (i) Propanone to Propan-2-ol
- (ii) Ethanal to 2-hydroxy propanoic acid
- (iii) Toluene to benzoic acid

(b) Give simple chemical test to distinguish between:

- (i) Pentan-2-one and Pentan-3-one
- (ii) Ethanal and Propanal

Or

a. Write the products of the following reactions:

