SWAMI VIVEKANAND ACADEMY

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Class – XII – Chemistry –Test Paper – Date: 19.12.2019

1. What are azeotropes? Give an example. 1

2. Which has the highest freezing point? 1
   (a) 1 M glucose (b) 1 M NaCl (c) 1 M $CaCl_2$ (d) 1 M AlF_3

3. What is meant by 'reverse osmosis'? 1

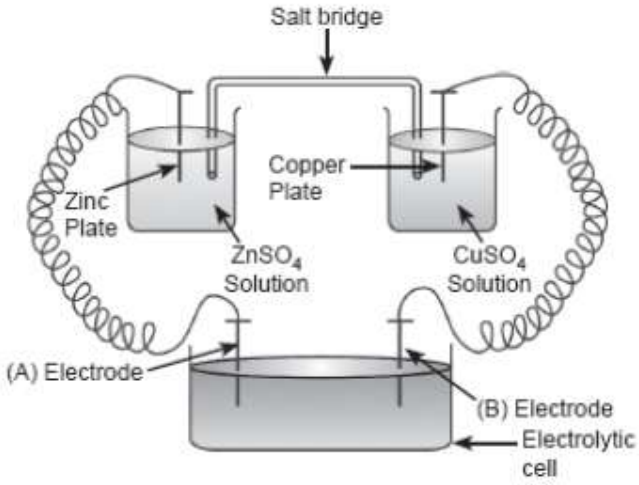
4. A 10% solution of urea is isotonic with 20% solution of 'x' at same temperature. Calculate molecular weight of x. 1

5. What are the values of ΔH and ΔV for positive deviation from ideality? Give one example. 1

6. Why is osmotic pressure of 1 M KCl is higher than that of 1 M urea solution? 1

7. State how does osmotic pressure vary with temperature. 1

8. Consider the following diagram in which an electrochemical cell is coupled to an eletrolytic cell. What will be the polarity of electrodes 'A' and 'B' in the electrolytic cell? 1



9. Why does alkaline medium inhibit rusting of iron? 1

10. Express the rate of the following reaction in terms of disappearance of hydrogen in the reaction: 1

$$3H_2\,(g) + N_2\,(g) \rightarrow 2NH_3\,(g).$$

11. Express the relation between the half-life period of a reactant and its initial concentration for a reaction of n^{th} order. 1

12. Following graph is a plot of the rate of a reaction vs concentration of the reactant. What is the order of the reaction? 1

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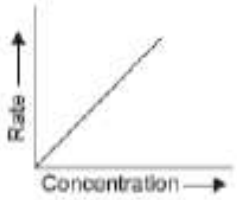

14. A reaction is 50% complete in 2 hours and 75% complete in 4 hours. What is the order of the reaction? 1

15. Physisorption is reversible while chemisorption is irreversible. Why? 1

16. Which has a higher enthalpy of adsorption, physisorption or chemisorption? 1

17. What is sorption? 1

18. What is meant by chemisorption? 1

19. Write a mathematical expression showing the relationship between the amount of solute adsorbed per unit mass of the solid adsorbent and the concentration of the solute in the solution. 1

20. Why do physisorption and chemisorption behave differently with rise in temperature? 1

21. Give one example each of sol and gel. 1

22. Name the two types of adsorption phenomenon. 1

23. Define the following terms: 2
(i) Mole fraction
(ii) Isotonic solutions
(iii) van't Hoff factor
(iv) Ideal solution

24. The density of water of a lake is 1.25 g mL^{-1} and one kg of this water contains 92 g of Na^+ ions. What is the molarity and molality of Na^+ ions in the water of the lake? (Atomic mass of Na = 23.00 u) 2

25. State Raoult's Law for a solution containing volatile components. How does Raoult's law become a special case of Henry's Law? 2

26. If N_2 gas is bubbled through water at 293 K, how many millimoles of N_2 gas would dissolve in 1 litre of water? Assume that N_2 exerts a partial pressure of 0.987 bar. Given that Henry's law constant for N_2 at 293 K is 76.48 kbar. 2

27. Determine the values of equilibrium constant (K_c) and ΔG° for the following reaction: 2
$Ni(s) + 2Ag^+(aq) \rightarrow Ni^{2+}(aq) + 2Ag(s)$, $E^\circ = 1.05$ V (1 F = 96500 C mol^{-1})

28. Define the following: 2
(i) Rate constant 'k' (ii) Activation energy (E_a)

29. Write two differences between 'order of reaction' and 'molecularity of reaction'. 2

30. How does change in temperature affect the rate of reaction? How can this effect on the rate constant of the reaction be represented quantitatively. 2

31. What mass of ethylene glycol (molar mass = 62.0 g mol^{-1}) must be added to 5.50 kg of water to lower the freezing point of water from 0 °C to −10.0 °C? (K_f for water = 1.86 K kg mol^{-1}) 3

32. State Henry's Law. What is the effect of temperature on the solubility of gas in a liquid? 3

33. The Henry's Law constant for oxygen dissolved in water is 4.34×10^4 atm at 25 °C. If the partial pressure of oxygen in air is 0.2 atm, calculate the solubility of oxygen in water at 25 °C. 3

34. Calculate the emf of the following cell at 25 °C: 3

Zn | Zn^{2+} (0.001 M) || H^+ (0.01 M) | H_2(g) (1 bar) | Pt(s)

$E^0_{(Zn^{2+}/Zn)} = -0.76$ V; $E^0_{(H^+/H_2)} = 0.00$ V

35. (a) Define the term conductivity and molar conductivity of the solution of an electrolyte. Comment on its variation with temperature. 5
(b) The measured resistance of conductivity cell was 100 ohms. If 7.45 g of KCl is dissolved per litre of solution. Calculate (i) specific conductance (ii) molar conductance. [$\frac{l}{A}$ = 1.25 cm^{-1}, Molar mass of KCl is 74.5 g mol^{-1}]

36. (a) Define the following terms: 5
(i) Activation energy (ii) Rate constant
(b) A first order reaction takes 10 minutes for 25% decomposition. Calculate $t_{1/2}$ for the reaction.
(Given: log 2 = 0.3010, log 3 = 0.4771, log 4 = 0.6021)