C 81851 (Pages : 3) Name.....

Reg. No.....

FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL/MAY 2015

(UG—CCSS)

Complementary Course

Chemistry

CH 4C 07—PHYSICAL CHEMISTRY—II

Time : Three Hours Maximum : 30 Weightage

I. Answer all the *twelve* questions. Each question carries a weightage of ¼.

1. For a chemical reaction to proceed in a particular direction, at a given temperature :

   (a) ΔH should be positive.

   (b) ΔS should be negative.

   (c) Both ΔH and ΔS should be negative.

   (d) ΔG should be negative.

2. Aqueous solution of which of the following salts will have lowest pH ?

   (a) CH_3 CooNa. (b) NH_4 Cl.

   (c) Na_2Co_3. (d) NaCl.

3. A primary reference electrode among the following is :

   (a) Calomel electrode. (b) SHE.

   (c) Quinhydron electrode. (d) Silver-Silverchloride eletrode.

4. Which among the following property of a liquid is related to its intermolecular force ?

   (a) Surface tension. (b) Viscosity .

   (c) Vapour pressure. (d) All these.

5. Which is not a colligative property ?

   (a) Osmotic pressure. (b) Elevation of B.P.

   (c) Depression of FP. (d) Vapour pressure.

6. At a particular temperature, osmotic pressure is maximum for an aqueous solution of :

   (a) .1M glucose. (b) .01M sucrose.

   (c) .1M NaCl. (d) 0.12M urea.

Turn over

7. A macromolecular colloid among the following is :

(a) Starch. (b) Soap.

(c) Gold sol. (d) Sulphur sol.

8. Which among the following is a lyophobic colloid ?

(a) Gelatin. (b) Starch.

(c) Gold sol. (d) Glue.

9. Work done is maximum in a ———— process.

10. The surface tension of a liquid ———— with increase in temperature.

11. The maximum number of phases that can exist in equilibrium, in an one component system is ————.

12. Give one example for an one component system.

(12 × ¼ = 3 weightage)

II. Answer all the *nine* questions. Each question carries a weightage of 1.

13. When a real gas is subjected to adiabatic expansion below a particular temperature, the gas gets cooled. Why ?

14. One mole of water at $100^{\circ}C$ changes to steam by absorbing 40.9 kJ of heat. If the work done by the system is 3.5 kJ, calculate the increase in internal energy.

15. What are the factors that affect the electrode potential of a half cell ?

16. The equivalent conductance of a 1×10^{-2} N solution of CH_3COOH is found to be 100 $ohm^{-1}\ cm^2\ eq^{-1}$. If the ionic conductance values of H^+ and CH_3COO^- ions are 350 and 40 $ohm^{-1}\ cm^2\ eq^{-1}$, respectively, calculate the degree of dissociation of CH_3COOH at this concentration.

17. Explain the effect of dissolved solutes in the surfacetension of a liquid.

18. Define osmotic pressure of a liquid.

19. The osmotic pressure of a 5% solution of an unknown solute in water is 3.6 atm at 300K. Calculate the molar mass of the solute.

20. Write any two mechanisms by which a colloid attains charge.

21. What is Hardy and Schulz rule ?

(9 × 1 = 9 weightage)

III. Answer any *five* questions. Each question carries a weightage of 2.

22. The heat of formation of (H_4cg) at constant volume is $-73.3kJ$ at 300K. Calculate the heat of formation at constant pressure, at 300K.

23. Explain the working of a calomel electrode.

24. The refractive index of CH_3COOH is 1.371 at a temperature at which its density is 1.046g cm^{-3}. Calculate the molar refraction of CH_3COOH.

25. Derive the general solution equation from the laws of osmotic pressure.

26. What are protective colloids ? Give examples. How is the efficiency of a protective colloid expressed ?

27. Explain the Donnan membrane equilibrium.

28. Explain the terms phase, components and degree of freedom, as used in phase rule.

(5 × 2 = 10 weightage)

IV. Answer any *two* questions. Each question carries a weightage of 4.

29. Derive the Clausius-Clapeyron equation for liquid-vapour equilibria.

30. What is meant by corrosion of metals ? Explain the methods suggested for the prevention of corrosion.

31. (i) Write the thermodynamic derivation of phase rule.

(ii) Discuss the Pattinson's process for the desilverisation of lead.

(2 × 4 = 8 weightage)