

## FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, MARCH 2013

(CCSS)

Chemistry

CH 4C 07—PHYSICAL CHEMISTRY—II

Time : Three Hours

Maximum : 30 Weightage

I. Answer *all* the questions. Each question carries a weightage of  $\frac{1}{4}$ . This part contains multiple choice, fill in the blanks and one-word answer questions :

1 If a system can exchange both matter and energy with the surroundings, it is called an \_\_\_\_\_ system.

2 In a reversible process,  $\Delta S_{\text{system}} + \Delta S_{\text{sum}}$  is :

(a)  $> 0$ .(b)  $< 0$ .(c)  $\geq 0$ .(d)  $= 0$ .

3 When a solid changes into liquid, the entropy ?

(a) Becomes zero.

(b) Increases.

(c) Decreases. \_\_\_\_\_

(d) Remains the same.

4 Specific conductance = observed conductance x \_\_\_\_\_

5 When a galvanic cell is written in an abbreviated form ?

(a) Left-hand electrode serves as cathode.

(b) Left-hand electrode serves as anode.

(c) Reduction reaction occurs at left-hand electrode.

(d) Left-hand electrode constitutes the positive terminal.

6 The surface tension of liquids become \_\_\_\_\_ at the critical temperature.

7 The rise of a liquid in a capillary tube is due to :

(a) Osmosis.

(b) Surface tension.

(c) Viscosity. \_\_\_\_\_

(d) Diffusion.

8 Osmotic pressure is directly proportional to \_\_\_\_\_

9 Brownian movement is an :

(a) Electrical property.

(b) Mechanical property.

(c) Optical property.

(d) Colligative property.

Turn over

10 A compound with a congruent melting point melts into a liquid of \_\_\_\_\_ composition as the solid .

11 A process can be termed spontaneous if :

- (a)  $\Delta H$  has a negative value .      (b)  $\Delta G$  has a positive value .  
(c)  $\Delta G$  has a negative value      (d) None of the above.

12 The oxidation potential of hydrogen electrode is taken as \_\_\_\_\_

(12 x  $\frac{1}{4}$  = 3 weightage)

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

13 What is a half-cell reaction ?

14 What are fuel cells ?

15 What is Hardy-Schulze rule ?

16 Explain the state of a chemical reaction when (a)  $\Delta G = 0$  ; (b)  $\Delta G > 0$  ; (c)  $\Delta G < 0$  .

17 What is the effect of pressure in the melting point of ice ?

18 What is meant by the term Gold Number ?

19 The heat of formation of  $\text{CH}_4$  at constant pressure and 300 K is  $-75.83$  kJ. Calculate the heat of formation at constant volume at 300 K.

20 Explain why the melting point curve in the phase diagram of water is inclined towards vertical axis.

21 Give any one utility of surface tension in daily life.

(9 x 1 = 9 weightage)

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

22 Describe -the application of phase rule to lead-silver system.

23 Derive **Clausius-Clapeyron** equation.

24 Discuss the importance and applications of colloids.

25 **Qinhydrone** electrode behaves as a reversible hydrogen electrode. Explain in detail.

26 State and explain Hess's law of constant heat summation. Discuss its applications. How is it based on first law of thermodynamics ?

27 Define Osmotic pressure. Describe a method for its measurement.

28 Define vapour pressure of a liquid at a given temperature. Explain the liquid state as a continuation of the gaseous state into a region of high molecular forces.

(5 x 2 = 10 weightage)

N. Write essays on any *two* of the following. Each question carries a weightage of 4.

29 What is meant by Joule-Thomson effect ? How do you account for it ? Show that Joule-Thompson coefficient is zero for an ideal gas, while it has a positive value in the case of a real gas.

30 Explain the principle of conductometric titrations. Discuss the titration curves of :

(a) A strong acid with a strong base.

(b) A strong acid with a weak base.

31 (a) Describe the optical and electrical properties of colloids.

(b) Explain Donnan membrane equilibrium.

(2 x 4 = 8 weightage)



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