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SARDAR PATEL UNIVERSITY
B.Sc. EXAMINATION
SEMESTER – V
Physical Chemistry (US05CCHE06)
Date: November 25, 2013 (Monday)
Time: 10:30 a.m. to 1:30 p.m.

Maximum Marks: 70

Q-1 Choose the correct option for each of the following. **[10]**

(1) How many degree of freedom is there in a system of liquid water & water vapor at equilibrium at pressure of 1 atmosphere
(a) 0 (b) 1 (c) 2 (d) 3

(2) The curve representing the equilibrium between liquid water and vapor at different temperature is
(a) Fusion curve (b) Sublimation curve (c) Vapor pressure curve (d) Transition curve

(3) A compound when heated giving a new solid phase and a solution with a composition different from that of solid phase is said to possess
(a) Incongruent melting point (b) Congruent melting point
(c) Peritectic temperature (d) Eutectic temperature

(4) Which one of the following is an incorrect statement for physisorption
(a) It is reversible process (b) It requires less heat of adsorption
(c) It requires activation energy (d) It takes place at low temperature

(5) For adsorption, the plot of log x/m against log p is linear with slope equal to
(a) K (b) log k (c) n (d) 1/n

(6) The quality and quantity of heavy metals present in organometallic compound can be identified by
(a) Thermal conductivity detector (b) Flame ionization detector
(c) Flame photometric detector (d) Electron capture detector

(7) The comparison of retention behavior of sample with that of carrier gas is known as
(a) Efficiency (b) Retardation factor (c) Retention time (d) Temperature programming

(8) In polarography, quantitative determination can be done by measuring
(a) Half wave potential (b) Limiting diffusion current (c) Applied voltage (d) Residual current

(9) The current due to the electrostatic forces of attraction between the ion and electrode is known as
(a) Diffusion current (b) Capacitive current (c) Migration current (d) Charging current

(10) The current due to the concentration gradient between two part of cell solution is known as
(a) Diffusion current (b) Capacitive current (c) Migration current (d) Charging current

Q-2 Attempt the following.(Any Ten) **[20]**

(1) Define: Polymorphism & Allotropy.

(2) Distinguish between triple point & freezing point.

(3) Define: Enantiotropy & Monotropy.

(4) Define: Sorption & Desorption.

(5) What is adsorption isotherm? What information can be obtained from it?

(6) What is effect of temperature and pressure on adsorption of gas by solid surface?

(7) Define: Retention time & Retention volume.

(8) Describe briefly the soap bubble meter.

(9) Define: Specific retention volume & Relative retention.

(10) What are polarographic maxima?

(11) Why dissolved oxygen must be removed from cell solution in polarography?

(12) How migration current can be eliminated in polarography?

Conti...

Q-3 Attempt the following.

(a) Discuss the phase diagram of benzene-naphthalene system which forms a simple eutectic system. **[05]**

(b) The vapour pressure of water at 95 °C is found to be 634mm of Hg. What would be the vapour pressure at a temperature of 100° C? The molar heat of vaporization in this range of temperature may be taken as 40593 J mol^{-1} **[05]**

OR

Q-3 Attempt the following.

(a) Discuss in detail the phase diagram for sulfur system. **[05]**

(b) Rhombic sulphur changes into monoclinic form at a temperature of 95.6 °C at 1 atm pressure. What would he the change in the transition temperature per atm change of pressure? **[05]**
Given : heat absorbed in the change = 597.5 calories per mole, density of rhombic sulphur & monoclinic sulphur is 2.05 g/c.c. & 1.95 g/c.c. respectively.

Q-4 Attempt the following.

(a) Describe the forces responsible for physical adsorption. **[05]**

(b) Describe various types of experimental physical adsorption isotherm. **[05]**

Q-4 Attempt the following.

(a) Starting with assumption, derive Langmuir adsorption isotherm. Discuss its various forms in different conditions. **[05]**

(b) Give the postulates of BET theory. Discuss BET theory & Give its equation. **[05]**

Q-5 Describe chromatographic column. Explain conditioning of column, the method of packing of column and column thermostating. **[10]**

OR

Q-5 Write a note on: (i) Thermal conductivity detector (ii) Flame ionization detector (iii) Electron capture detector **[10]**

Q-6 Attempt the following.

(a) Write a note on: (i) Residual current (ii) Catalytic current **[05]**

(b) Calculate the diffusion current that would be expected from the reduction of 2.0×10^{-3} M Pb^{+2}. The diffusion coefficient for Pb^{+2} is 1.01×10^{-5} cm^2/sec, m = 1.9 mg/s and t = 3.47 sec /drop. An unknown solution containing Pb^{+2} gives diffusion current of 11.7 µA with same DME as above. What is the concentration of Pb^{+2} in this solution? **[05]**

OR

Q-6 Attempt the following.

(a) Write a note on: (i) Direct comparison method (ii) Standard addition method **[05]**

(b) Calculate the experimental diffusion current constant value for Cd^{+2} from the following data. How does it compare with its theoretical value? **[05]**
i_d=4.2µA, m=1.41 mg/s, t=1.85 sec, C=1mM, $D=0.72\times10^{-5}$

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