

V.P. AND R.P.T.P. SCIENCE COLLEGE, VALLABH VIDYANAGAR
INTERNAL EXAMINATION
B.Sc. (SEM- V) US05CCHE06 PHYSICAL CHEMISTRY

Date : 08.10.2018

Time. 10.00 am – 12.00 noon

Marks: 50

Q-1 Choose one most appropriate response out of four provided to you. (08)

- (i) Eutectic point of a system and triple point are:
 (a) identical (b) different (c) always the same (d) both zero variant
- (ii) Phase rule:
 (a) is of little value in case of very slow equilibrium state attaining system.
 (b) can't predict the behavior of a system under different set of conditions.
 (c) requires information regarding molecular micro-structure of system.
 (d) takes into cognizance the nature as well as quantities of components present.
- (iii) Energy evolved during adsorption process is called
 (a) adsorption energy (b) surface energy
 (c) adsorption enthalpy (d) none of these
- (iv) When calcium chloride is kept open in moisturized air then _____ process occurs.
 (a) sorption (b) adsorption (c) absorption (d) desorption
- (v) Hydrogen carrier gas has a disadvantage that it may react with
 (a) benzene ring (b) saturated compound
 (c) un saturated compound (d) none of these
- (vi) Time required for the solute for achieving maximum peak to reach the detector in gas chromatography column is called
 (a) retention time (b) retention volume
 (c) retention solute (d) none of these
- (vii) Limiting diffusion current is directly proportional to the concentration of reducible ions
 (a) at the surface of the dropping mercury electrode.
 (b) at the bulk of the solution.
 (c) concentration gradient.
 (d) none of these
- (viii) Before carrying out polarographic analysis, the solution to be analyzed is flushed with a stream of
 (a) oxygen (b) carbon dioxide (c) nitrogen (d) chlorine

**Q-2 Write answers of any five questions out of eight given below. (10)**

- (i) How can we use concept of phase equilibria to obtain silver from argentiferous lead?
- (ii) Define polymorphism and enantiotropy.
- (iii) Define with example sorption and desorption.
- (iv) Write any two applications of adsorption process.
- (v) What is self purring technique?
- (vi) Explain HETP in chromatography, explaining each and every term.
- (vii) What precautionary measures are adopted while using dropping mercury electrode?

- (viii) Supporting electrolyte of high concentration is used in polarography. Explain. (04)
- Q-3 (a) Draw and discuss the phase diagram in which two components form a compound with congruent melting point. (04)
- (b) Discuss in detail about phase diagram of sulphur system. (04)
- OR
- Q-3 (a) Derive Gibb's phase rule thermodynamically. (04)
- (b) A lady weighing 50 kg is standing on ice wearing shoes with sole area 60 cm^2 per shoe. The melting point of ice decreases by $0.0075 \text{ }^\circ\text{C}$ if the pressure is increased by 1 atm. Calculate the temperature at which the ice will melt under her feet. (04)
- Q-4 Write down the limitations of Freundlich adsorption isotherm and explain how it can be overcome, deriving Langmuir equation for adsorption of gases on solid surface along with its limitations. (08)
- OR
- Q-4 Differentiate between physisorption and chemisorption. (08)
- Q-5 Explain basic principle of gas chromatography and enlist the detectors used in it, explaining any two detectors. (08)
- OR
- Q-5 Write down applications of gas chromatography in qualitative analysis, quantitative analysis, automated elemental analysis of organic compounds and miscellaneous applications. (08)
- Q-6 (a) How would you determine the concentration of test ion by pilot ion method and standard addition method? (04)
- (b) A DME has following characteristics: (i) weight of mercury collected through capillary for 100 seconds is 0.196 grams. (ii) 5 drops of mercury collected in 21.6 seconds. When this DME was used, it gives a diffusion current of $8.76 \mu\text{A}$ for a standard solution of 0.001 M Zn^{+2} . After this experiment, capillary was replaced identically and a new DME was used having drop time of 6.13 seconds and a flow rate of mercury of 3.85 mg/ sec . Calculate the concentration of Zn^{+2} gave a diffusion current of $16.3 \mu\text{A}$ with new electrode. (04)
- OR
- Q-6 (a) Prove that half wave potential is independent of the concentration of the solution. (04)
- (b) A solution gave a lead wave whose diffusion current was $6.7 \mu\text{A}$ when 'm' was 2.5 mg/sec and 't' was 3.40 seconds. The height of the column mercury above the capillary was then changed. In this new condition drop time became 4 seconds. What was the diffusion current of lead wave under this new condition? (04)

