

Section – C

Q-5. (a) Derive an expression for Gibb's Hemholtz equation, How can you calculate emf of a cell with the help of this equation. (10)

(b) One mole of helium gas is heated from a temperature of 300k to 600k. Calculate the entropy change if (i) volume is kept constant. (ii) Pressure is kept constant assume that helium behaves like an ideal gas and $C_v = 3/2R$. (10)

Q-6. (a) 50 ml of standard hard water containing 1 mg of pure CaCO_3 per ml consumed. 20 ml of EDTA. 50 ml of water sample consumed 25 ml of same EDTA solution using EriochromeBlack-T indicator. Calculate the total hardness of water sample in ppm. (5x4)

(b) Calculate temporary & total hardness of a sample of water containing

$\text{Mg}(\text{HCO}_3)_2 = 7.3 \text{ mg/l}$, $\text{Ca}(\text{HCO}_3)_2 = 16.2 \text{ mg/l}$

$\text{MgCl}_2 = 9.5 \text{ mg/l}$ and $\text{CaSO}_4 = 13.6 \text{ mg/l}$

(mol wt $\text{Ca}(\text{HCO}_3)_2 = 162$, $\text{Mg}(\text{HCO}_3)_2 = 146$.)

$\text{CaSO}_4 = 136$, $\text{MgCl}_2 = 95$

(c) What are various units of hardness. How are they interrelated. Write structure of EDTA & Ca-EDTA complex.

(d) Discuss Calgon Conditioning.

Q-7. (a) Describe the application of Phase rule in study of binary system forming compound with congruent melting point.

(b) Write merits & limitations of phase rule

(c) Write short note on reverse osmosis. (8+6+6)

Q-8. (a) What are reducing and non reducing sugars. Give an example of each case. (5x4)

(b) Write short note on mutarotation

(c) What are α -amino acids? Give names & write structural formula of two α -amino acids. Why are amino acids called amphoteric compound.

(d) Give one method for N-terminal analysis in case of protein.

Roll No.

Lingaya's University, Faridabad
B.Tech (Term – II)
Examination – January, 2010
Applied Chemistry
Paper: CH-101

Time: 3 Hours]

[Max. Marks: 100

Before answering the question, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after the examination.

Note: All questions carry equal marks. Attempt five questions. Question 1 is compulsory. Select two questions from Section B & Two from Section C.

Section – A

Q-I Part A

Select the correct answer of the following multiple choice questions.

(i) The spontaneous nature of reaction is impossible if (10)

- (a) ΔH is +ve, ΔS is also +ve (b) ΔH is -ve, ΔS is +ve
(c) ΔH is +ve, ΔS is -ve (d) ΔH is -ve, ΔS is -ve

(ii) Entropy of the universe

- (a) remains constant (b) always decreasing & tending towards zero
(c) is decreasing and increasing with a periodic rate
(d) is increasing and tending towards a maximum rate.

(iii) For an irreversible process if $T_1 > T_2$ then

(a) $\Delta S_{\text{irrev}} = q \left(\frac{q_1 + q_2}{T_1 T_2} \right)$ (b) $\Delta S_{\text{irrev}} = q \left(\frac{T_1 - T_2}{T_1 T_2} \right)$

(c) $\Delta S_{\text{irrev}} = q \left(\frac{T_2 - T_1}{T_1 T_2} \right)$ (d) none of these

(iv) In lead-silver system, the percentage of silver present at eutectic point is

- (a) 97.4% (b) 98% (c) 2.6% (d) 3.7%

(v) At peritectic temperature, the number of phases present in Na-K system is

- (a) 2 (b) 0 (c) 3 (d) 1

(vi) At the eutectic point system is

- (a) multivariant (b) invariant (c) univariant (d) bivariant

(vii) An exhausted anion exchange resin can be regenerated by treating it with.

- (a) concentrated brine solution (b) concentrated NaOH solution
(c) dilute brine solution (d) concentrated HCl solution

(viii) In case $p > \frac{1}{2}$ M, alkalinity of water is due to.

- (a) CO_3^{2-} and HCO_3^- (b) OH^- and CO_3^{2-}
(c) OH^- and HCO_3^- (d) all of three

(ix) The hardness has units

- (a) mg/l (b) ppm (c) french (d) all of these

(x) In our body water act as

- (a) lubricant (b) medium for biological activities
(c) only add weight to our body (d) none of these

(xi) Seasonal cracking is a case of

- (a) dry corrosion (b) stress corrosion
(c) differential aeration corrosion (d) pitting corrosion

(xii) To prevent the caustic embrittlement in the boilers during steam generation, the chemical to be added is

- (a) sodium sulphate (b) sodium carbonate
(c) sodium chloride (d) calcium hydroxide.

(xiii) When the viscosity index of a lubricant is high its viscosity

- (a) changes at high rate with change in temperature
(b) does not change with change in temperature
(c) changes at a low rate with change in temperature
(d) shows irregularities when temp. is changed.

(xiv) Which of the following is not true for synthetic lubricants.

- (a) they possess high thermal stability
(b) their viscosity index values are quite high
(c) they possess low flash points
(d) they are fairly resistant to oxidation & hydrolysis

(xv) The coefficient of friction

- (a) depends upon the speed of the object
(b) depends upon the apparent area of contact
(c) is independent of apparent area of contact

(d) is independent of load applied

(xvi) Spin multiplicity of singlet excited state is

- (a) one (b) two (c) three (d) none of these

(xvii) Two single electrons are parallel in

- (a) singlet state (b) triplet state (c) both (a) and (b) (d) neither (a) nor (b)

(xviii) Sucrose is an example of

- (a) reducing sugar (b) non reducing sugar (c) both (d) none.

(xix) Which of the following act as photosensitizer during photosynthesis

- (a) CO_2 (b) N_2 (c) O_2 (d) chlorophylls

(xx) Iodine value of a lubricant is the measure of

- (a) unsaturation (b) tendency of a fatty oil to under go oxidation
(c) the formation of gummy products (d) all of above

Part- B

(a) What is condensed phase rule? When is it applied? Calculate number of components in following equilibria



(b) Explain term chemical potential with its significance. In terms of chemical potential what are conditions for spontaneity of the reaction and for the equilibrium. (5)

Section – B

Q-2. (a) Define photochemical reaction Draw & explain Jablonski diagram depicting fluorescence and phosphorescence. (10)

(b) State first and second law of photochemistry. Justify the statement that 'the chemiluminescence's is the reverse of photochemical process. (10)

Q-3. (a) Explain mechanism of boundary lubrication and extreme pressure lubrication. (10)

(b) Explain following properties of lubricants (i) viscosity index (ii) Aniline value and give their significance also. (10)

Q-4. (a) Write note on following. (10)

(i) Impressed current cathodic protection (ii) Anodic protection

(b) Explain mechanism of following. (10)

(i) Pitting corrosion (ii) Galvanic corrosion