

INTERNATIONAL CENTRE FOR APPLIED SCIENCES (MAHE, MANIPAL) II SEMESTER B.S. DEGREE EXAMINATION - APRIL/ MAY 2018 SUBJECT: CHEMISTRY (CH 121) (OLD SCHEME)

Monday, 23 April 2018

Time: 3 Hours

Max. Marks: 100

✓ Answer any FIVE full questions.

- 1A. What is standard electrode potential? Derive Nernst equation for the electrode potential of a single electrode.
- 1B. With a neat diagram, explain the construction and working of the glass electrode. Write two advantages and limitations of glass electrode.
- 1C. Calculate E.M.F. of the zinc silver cell at 25°C when $[Zn^{2+}] = 1.0$ M and $[Ag^+] = 10$ M $(E^0cell=1.56V \text{ at } 25^\circ\text{C})$. Write the cell representation and cell reaction

(8+8+4)

- 2A. Define Corrosion. Give the classification of corrosion with examples. Write the reactions involved in the process of rusting of iron.
- 2B. Explain the following: i) stress corrosion. ii) Caustic embrittlement and the methods of its prevention.
- 2C. Predict the effect of the following changes on the reaction 2 SO₃(g) \rightleftharpoons 2 SO₂(g) + O₂(g) Δ H^o = 197.78 kJ using Le Chatelier's Principle:
 - i) Increasing the temperature of the reaction.
 - ii) Increasing the pressure on the reaction.
 - iii) Adding more O₂ when the reaction is at equilibrium.
 - iv) Removing O₂ from the system when the reaction is at equilibrium.

(8+8+4)

- 3A. Define salt hydrolysis. Discuss the types of salt hydrolysis with a suitable example.
- 3B. Write a note on the followingi) Preparation of colloidal solutions by double decomposition method.ii) Action of acidic buffer
- 3C. The solubility product of AgCl is 1.56×10^{-10} at 25°C. Calculate its solubility in mole per liter and gram per liter, assuming the dissolved salt to be cent per cent ionised.

(8+8+4)

- 4A. Explain the type of hybridization and the resulting structure for ethylene. Give four differences between sigma and pi bond.
- 4B. Explain the four characteristic properties of ionic compounds. Discuss the Born-Harber cycle for the formation of NaCl crystal.
- 4C. Give the important postulates of VSEPR theory.

CH 121

- 5A. Explain the eight characteristic properties of covalent compounds
- 5B. Draw and explain the phase diagram of lead-silver system.
- 5C. Predict the bond order and magnetic nature of O₂ molecule with the help of MO theory.

(8+8+4)

- 6A. Derive a relationship between hydrolysis constant, ionic product of water and the dissociation constants for the hydrolysis of i) ammonium chloride and ii) ammonium acetate.
- 6B. Write a note on:
 - i) Electro dialysis
 - ii) Lewis concept of acids and bases
- 6C. Give reasons:
 - i) Peeling of tin coat on iron leads to corrosion
 - ii) In water molecule H-O-H bond angle is 104.5° .

(8+8+4)

- 7A. i) Define the rate of a chemical reaction. Derive an expression for the rate constant of a second order reaction.
 - ii) Explain any three factors influencing the rate of chemical reaction.
- 7B. Derive Gibbs-Helmholtz equation. Discuss its applications and significance.
- 7C. Write a note on Corrosion inhibitors

(8+8+4)

- 8A. Define Hess's law of heat of summation. Explain the applications of Hess's law.
- 8B. i) On the basis of VB theory, discuss the shapes of MO orbitals formed by the s-s and p-p atomic orbital overlapping's.

ii) What is hydrogen bonding? Explain intra molecular and inter molecular hydrogen bonding with examples.

- 8C. Give reasons:
 - i) The colloidal particles precipitate on adding an electrolyte
 - ii) Tyndall effect is more predominant in lyophobic colloids than in lyophilic colloids.

(8+8+4)