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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
MID SEMESTER EXAMINATION-2015
B.Tech. (Civil) II[nd] Semester

COURSE CODE: 10B11CL212 MAX. MARKS: 30
COURSE NAME: CHEMISTRY
COURSE CREDITS: 4 MAX. TIME: 2 HRS

Note: All questions are compulsory.

Section A **(Marks: 6[1 each])**

Q1(a). In strong acid and weak base titration phenolphthalein is not a suitable indicator. Why?
(b). List two factors that can be varied to change the speed of a particular reaction.
(c). Potash alum is used for removing impurities from water. Why?
(d). Do o-nitrophenol and p- nitrophenol have hydrogen bonding in their molecules? Explain.
(e). In adsorption isobar of chemisorption why there is initial increase in the curve?
(f). Differentiate between differential rate laws and integrated rate laws.

Section B **(Marks: 9)**

Q1. Elucidate the classification of colloids based on the type of particles of the dispersed phase. (3)

Q2(a). Electron gas acts as a bond in metals. Why? (1)
(b). Elaborate the flocculation value and Buffer capacity. (2)
Q3. Deduce the Langmuir's adsorption isotherm. (3)

Section C **(Marks: 15)**

Q1(a). A buffer solution is of 0.2 M of acetic acid and 0.25 M of CH_3COOK per litre. Calculate the change in pH value of the solution if 0.5 ml of 1 N HCl is added to it. K_a for acetic acid at 25°C is 1.8×10^{-5}. The volume change on adding HCl may be neglected. (3)
(b). KCl has a simple cubic lattice with K^+ and Cl^- ions taken as identical and the (100) plane spacing is 315.2 pm. At what angle would first order reflection from (100) plane be observed, if X-rays of wavelength 153.7 pm are used? (2)

Q2. 29.25 gm of NaCl was dissolved 5000 litres of water at 25°C. The solution may be regarded as infinitely dilute. $\lambda^\circ Na^+$ and $\lambda^\circ Cl^-$ are 50.1 and 76.3 $ohm^{-1}\ cm^2\ g\ eq^{-1}$ respectively.
Calculate (i) Λ_o for the solution (ii) Specific conductance of solution. (iii) Resistance of the cylindrical column of solution whose height is 24 cm and the base diameter is 2 cm. (5)

Q3(a). A certain substance A is mixed with an equal moles of a substance B. At the end of one hour, A is 75% reacted. How much will A and B be left unreacted at the end of two hours, if the reaction is (i) first order with A and independent of B (ii) first order with both A and B? (2)
(b). Can we use a nickel spatula to stir a solution of copper sulphate? ($E^\circ_{Ni^{2+}/Ni} = +0.025V$; $E^\circ_{Cu^{2+}/Cu} = +0.34V$) (1)
(c). Calculate the mole fraction of ethanol and water in a sample of rectified spirit which contains 46 % ethanol by mass. (1)
(d). Calculate the EMF of a concentration cell at 25°C consisting of two Zn electrodes immersed in solutions of Zn^{2+} ions of 0.1 M and 0.01 M concentrations. (1)