



EASTERN UNIVERSITY, SRI LANKA
FIRST SEMESTER THIRD EXAMINATION IN SCIENCE
2007/2008 (Dec.2008)
CH 303 ELECTROCHEMISTRY

Time: One hour
Answer all questions

$$F = 96485 \text{ C mol}^{-1}, 2.303 RT/F = 0.0591, R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$$

- 1)
- a) i. Write down the Debye-Huckel equation for the mean activity coefficient of electrolytes and identify the terms in it. (10 marks)
- ii At what concentration of Na_3PO_4 would have an ionic strength of 0.3? (20 marks)
- b) i. Define the term molar conductivity? (05 marks)
- ii. Specific conductivity of a saturated solution of AgCl at 25°C was found to be $3.41 \times 10^{-6} \text{ ohm}^{-1} \text{ cm}^{-1}$. The specific conductivity of water used to make up the solution was $1.60 \times 10^{-6} \text{ ohm}^{-1} \text{ cm}^{-1}$. Determine the solubility of AgCl in water. Ionic conductivity of Ag^+ and Cl^- at 25°C is 60.3 and $78.0 \text{ ohm}^{-1} \text{ cm}^{-1}$ respectively (30 marks)
- c) i. Define the term transport number of an ion (05 marks)
- ii. In a 0.1 M NaCl solution, the transport number of Na^+ ion is 0.318 and mobility of an Na^+ is $4.01 \times 10^{-8} \text{ m}^2 \text{ v}^{-1} \text{ s}^{-1}$. Find out the mobility of Cl^- and the drift velocity of Cl^- in the field $E = 100 \text{ v m}^{-1}$. (30 marks)
- 2)
- i. If the EMF of the following cell
 $\text{Pt}/\text{H}_2(1 \text{ atm})/\text{H}^+(x \text{ molar})//\text{KCl}(0.1 \text{ M})/\text{Hg}_2\text{Cl}_2/\text{Hg}$ is 0.50 V at 25°C , what would be the pH of the x molar acid solution? (Electrode potential of the calomel electrode is 0.281 V at 25°C). (40 marks)
- ii. Calculate the free energy change of the following cell at 25°C .
 $\text{Sn}/\text{Sn}^{2+}(a = 0.6)//\text{Pb}^{2+}(a = 0.3)/\text{Pb}$. Standard EMF of the cell is 0.014 V. (35 marks)
- iii. Discuss the curve obtained by conductrimetric titration of a strong acid with a weak base. (25 marks)