

Eastern University, Sri Lanka

Third Year Special Repeat Examination in Science

2008/2009 (February 2010)

CH 303 Electrochemistry

Time Allowed: ONE HOUR

Answer all questions

1. (a) Define the term 'molar conductivity' (10 marks)

(b) By using Arrhenius ionization theory Show that $\frac{\Lambda}{\Lambda^0} = \alpha$, for a weak electrolyte.

where Λ - molar conductivity, Λ^0 - molar conductivity at infinite dilution and α - degree of dissociation of a weak electrolyte. (15 marks)

(c) The resistance of a 0.01 M solution of acetic acid measured in a cell of cell constant 0.20 cm^{-1} was found to be 760Ω at 25°C . The limiting molar conductivity of CH_3COONa , HCl and NaCl at the same temperature are 91.0, 425.0 and $128.0 \text{ S cm}^2 \text{ mol}^{-1}$ respectively. Calculate,

i) the molar conductivity (Λ) of the acid solution (20 marks)

ii) the molar conductivity of acetic acid at infinite dilution ($\Lambda_{\text{CH}_3\text{COOH}}^0$) (20 marks)

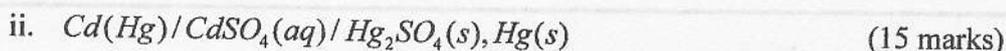
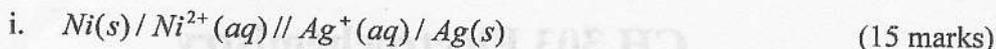
iii) the degree of dissociation (α) (10 marks)

Turn Over

- (d) The resistance of 0.01 M NaCl solution at 298 K is 200 Ω . Cell constant of the conductivity cell is 2 cm^{-1} . Calculate the molar conductivity of the solution.

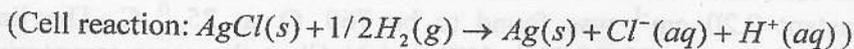
(25 marks)

2. (a) Write the electrode half – reactions and the cell reactions for the following cells.



- (b) Calculate the mean ionic activity coefficient of 0.1 M HCl at 25 $^{\circ}\text{C}$ giving that the E_{cell} and E_{cell}^{θ} of the cell $\text{H}_2(1\text{atm}) / \text{HCl}(aq), \text{AgCl}(s) / \text{Ag}(s)$ are 0.3524 V and 0.2224 V respectively at the same temperature.

$$\left[2.303 \frac{RT}{F} = 0.0591 \right]$$



(40 marks)

- (c) Discuss the variations on conductivity with respect to added volume of base during a strong acid – strong base titration.

(30 marks)

End of paper