



DOON UNIVERSITY, DEHRADUN
Mid Semester Examination, March, 2018
Department of Chemistry, School of Physical Sciences
Integrated M.Sc. Chemistry (IV Semester)
Course: CYC-253: Physical Chemistry IV: Electrochemistry

Time Allowed: 2 Hours.

Maximum Marks: 30

Note: Attempt All Questions

SECTION: A

Attempt All Questions.

(Marks: 6Q × 1 = 6)

1. Define transport number and its significance.
2. Draw a graph for conductometric titration between a mixture of strong and weak acid against NaOH.
3. The molar ionic conductance at infinite dilution of silver ions is $61.92 \times 10^{-4} \text{ Sm}^2 \text{ mol}^{-1}$ at 25 degrees centigrade. Calculate the ionic mobility of silver ions at the same temperature and dilution conditions.
4. Write the working equation for determination of transport no of cation by Hittorf's method.
5. Define cell constant and specific resistance.
6. Draw a graph of variation of molar conductance with dilution for KCl and CuSO_4 solutions.

SECTION: B

Attempt All Questions.

(Marks: 6Q × 2 = 14)

7. With the help of a graph explain conductometric titration of CH_3COOH with NaOH.
8. Write a note on Wien effect.
9. How does conductance of an electrolyte vary with the frequency of alternating current?
10. What is Grotthus theory of ion conductance?
11. The molar ionic conductance of 0.01 M acetic acid solution was found to be $16.30 \times 10^{-4} \text{ Sm}^2 \text{ mol}^{-2}$ at 25 degrees centigrade. The molar ionic conductance of hydrogen and acetate ions at infinite dilution are 349.8×10^{-4} and $40.9 \times 10^{-4} \text{ Sm}^2 \text{ mol}^{-1}$, respectively. What percentage of acetic acid is dissociated at this concentration?
12. How do you relate the ionic conductance of an ion with viscosity of the solvent?

SECTION: C

Attempt All Questions.

(Marks: 4 Q × 3=12)

13. Compare the ionic conductance of RO^- ion in ROH system, qualitatively, given that R is $-\text{CH}_3$ and $-\text{C}_3\text{H}_7$ in two different RO^- ions.
14. Explain the moving boundary method for determination of transport number of an ion.
15. At 25°C , the molar conductance of an organic acid at infinite dilution is $386.6 \text{ Scm}^2 \text{ mol}^{-1}$. If its ionization constant is 1.4×10^{-5} . Calculate molar conductance of 0.05 M this acid solution at 25°C ?
16. Illustrate how the solubility of a sparingly soluble salt can be determined with the help of conductance measurement.