

Exam. Code : 103205

Subject Code : 8054

B.A./B.Sc. 5th Semester (Old Syllabus 2017)

CHEMISTRY

Paper—Physical Chemistry—III

Time Allowed—3 Hours]

[Maximum Marks—35

Note :— Log Tables may be asked for.

PART—A

Note :— All questions are compulsory. Each question carries 1 mark.

1. Define specific conductance. How does it vary with dilution ?
2. State Kohlrausch law. Mention its significance.
3. What is reference electrode ? Give one example.
4. Define pH and pK_a.
5. Draw a conductivity curve for titration of HCl and NaOH.
6. What is buffer solution ? Give one example of buffer solution.
7. What is the cause of radioactivity ?
8. What is the significance of selection rules in spectroscopy ?

8×1=8

PART—B

Note :— Attempt six questions in all, selecting two questions from each section. Each question carries 4½ marks.

SECTION—I

9. (a) Describe Arrhenius theory of electrolyte dissociation and mention its limitations.

- (b) How will you determine the solubility product of a sparingly soluble salt by conductivity measurements ?

2.5,2

10. (a) How will you determine pH of a solution by using hydrogen electrode ?
- (b) 60 cc of silver nitrate solution contains 13.143 g of the salt. It was electrolysed using platinum electrodes. After electrolysis 60 cc of the anode solution was found to contain 12.553 g AgNO₃ and 1.259 g Ag deposited after passing electricity. Calculate transport numbers of Ag⁺ and NO₃⁻ ions.

1.5,3

11. Write notes on the following :—

- (a) Concentration cells.
- (b) Corrosion
- (c) Potentiometric titrations.

3×1.5

SECTION—II

12. Explain the difference between the following :—

- (a) Thermal and nuclear reactions.
- (b) Binding and bond energies.
- (c) Nuclear fission and nuclear fusion.

3×1.5

13. (a) Give an account of nuclear models.

- (b) Enlist important applications of radioactivity.

3,1.5

14. Write notes on the following :—

- (a) Artificial radioactivity.
- (b) Nuclear forces
- (c) Radioactive decay.

3×1.5

SECTION—III

15. (a) Tabulate the difference between alpha, beta and gamma radiations.
- (b) Give qualitative description of non-rigid rotor.
- (c) The force constant of CO molecule is 1870 Nm^{-1} . Calculate the vibrational frequency in cm^{-1} . 3×1.5
16. (a) Taking a suitable example, explain P, Q and R branches in vibrational-rotational spectra.
- (b) Describe the effect of anharmonic motion and isotope on the vibrational spectrum. 2.5, 2
17. Explain the following :—
- (a) Franck-Condon principle
- (b) Born-Oppenheimer approximation
- (c) Harmonic Oscillator. 3×1.5