

Reg. No

Name

20P3033

MSc DEGREE END SEMESTER EXAMINATION - OCT/NOV 2020: JAN 2021

SEMESTER 3 : CHEMISTRY / PHARMACEUTICAL CHEMISTRY

COURSE : 16P3CHET11 / 16P3CPHT11 : PHYSICAL CHEMISTRY - III

(For Regular - 2019 Admission and Supplementary - 2016/2017/2018 Admissions)

Time : Three Hours

Max. Marks: 75

PART A

Answer any 10 (2 marks each)

1. How does T-jump method determine the relaxation time of a fast reaction?
2. Define Steric factor. Explain how it is able to rectify the hard sphere collision theory.
3. What is meant by potential energy surface of the reaction, $A + B \rightarrow A-B + C$?
4. Illustrate Lineweaver-Burkman plot?
5. What is Bronsted catalysis law
6. What is the effect of dilution on specific conductivity and equivalent conductivity?
7. What is cell constant ? How is it determined ? What is the role of KCl in the determination of electrolytic conductance ?
8. How Arrhenius correlate conductance ratio with degree of dissociation of electrolytes ? What are the limitations of the theory ?
9. What are excimers and exciplexes?
10. What is an exciplex? Give an example
11. Define CMC.
12. What are lyophilic colloids? Give examples.
13. Write a note on micellisation.

(2 x 10 = 20)

PART B

Answer any 3 (5 marks each)

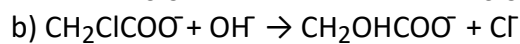
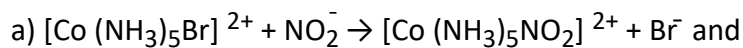
14. Write a note on the NMR and ESR methods of studying fast reactions
15. Give the modifications applied to Debye-Huckel equation for appreciable concentrations. Describe the modification applied by Huckel and Bronsted.
16. Explain the photochemistry of vision
17. How is HREELS useful in probing solid surfaces?

(5 x 3 = 15)

PART C

Answer any 2 (5 marks each)

18. For a homogeneous gaseous reaction, the rate constants are $3.0 \times 10^{-5} \text{ L mol}^{-1} \text{ s}^{-1}$ and $1.2 \times 10^{-3} \text{ L mol}^{-1} \text{ s}^{-1}$ at 629K and 700K respectively. Calculate the energy of activation and Frequency parameter.
19. Represent the equation that shows the effect of dielectric constant of the medium on the rate a reaction and apply to discuss the effect of increasing dielectric constant of the medium on the rate of the following reactions,



20. The mobility of a chloride ion in water at 25°C is $7.91 \times 10^{-4} \text{ cm}^2 \text{ S}^{-1} \text{ V}^{-1}$. a) Calculate the molar conductance of the ion at infinite dilution. b) How long will it take for the ion to travel between two electrodes separated by 4.0 cm if the electric field is 20 V cm^{-1} ?
21. In the photochemical combination of $\text{H}_2(\text{g})$ and $\text{Cl}_2(\text{g})$, a quantum yield of 10^6 is obtained when a wavelength of 480 nm is used. Determine the number of moles of HCl produced.
(5 x 2 = 10)

PART D

Answer any 2 (15 marks each)

22. Discuss briefly Semenov-Hinshelwood theory of branching chain reaction.
23. a) Give the thermodynamical formulation of rate in the conventional transition state theory. b) The pre exponential term for a unimolecular reaction occurring at 200°C is 2.75×10^{15} . Calculate the entropy of activation.
24. (a) What are the deviations observed from Debye Huckel Onsager equation
(b) Explain the extension of DHO equation to ion solvent interaction
(c) Explain Debye-Huckel Limiting law
25. What is Donnan membrane equilibrium? How it is useful in the determination of the molecular weight of the polymer?

(15 x 2 = 30)