

| SEM | SET | PAPER CODE | TITLE OF THE PAPER |
|-----|------|--------------|------------------------------------|
| VI | 2012 | 11UCH630303A | SPECTROSCOPY AND CHEMICAL KINETICS |

SECTION – A**Answer all the questions:****20 x 1 = 20****Choose the correct answer:**

- In Haber process of synthesis of ammonia the promoter used is
 - Fe
 - Mo
 - Ni
 - V₂O₅
- Raman Effect is due to
 - Absorption
 - Emission
 - Elastic collision
 - Inelastic collision
- The $t_{1/2}$ is inversely proportional to the concentration 'a' in _____ order of reaction.
 - first
 - second
 - zero
 - pseudo first
- Decrease in ionic strength, _____ the rate of the reaction.
 - Neutralizes
 - Increases
 - Decreases
 - Does not alter
- Enthalpy of adsorption is always _____.
 - zero
 - positive
 - negative
 - Neutral

Fill in the blanks:

6. Wave number is related to energy as _____.
7. The Arrhenius equation can be written as _____.
8. The catalyst is used in contact process of production of sulphuric acid _____.
9. For every ten degree rise in temperature the reaction becomes _____.
10. Acid catalyzed ester hydrolysis follows _____ order.

State True or False:

11. The reduced mass of a hetero diatomic molecule is
$$\mu = m_1 m_2 / m_1 + m_2.$$
12. Electronic absorption bands are broad due to accompanied rotational and vibrational transitions.
13. Radio activity is an example of first order reaction.
14. When the reaction is not a true equilibrium we apply steady state approximation.
15. Formation of CuO is an example of physisorption.

Match the following:

- | | |
|----------------------------|-------------------------------|
| 16. Hydrogen bonding | - a) Invertase |
| 17. Physisorption | - b) can be zero |
| 18. Enzyme | - c) no change in bond length |
| 19. Order | - d) increase with pressure |
| 20. Frank Condon Principle | - e) Weak bond |

SECTION – B

Answer all the questions:

5 x 4 = 20

21. a. Write short note on electromagnetic radiation.

OR

b. Explain the stretching and bending vibrations in carbondioxide.

22. a. State and explain mutual exclusion principle.

OR

b. Discuss Frank Condon principle.

23. a. What is order of a reaction? Mention any two methods of determining order of a reaction.

OR

b. Show that in the case of a first order reaction, the time required for 99.9% of the reaction to takes place is about ten times than that required for half the reaction.

24. a. Derive a relationship for unimolecular reaction according to Lindmann's hypothesis.

OR

b. Calculate the activation energy of a reaction whose reaction rate at 27°C gets doubled for 10°C rise in temperature.

25. a. Derive a relationship for Langmuir theory of adsorption and explain the plot of rate verses pressure at constant temperature.

OR

b. Write short note on (i) isobar (ii) isostere

SECTION – C

Answer any FOUR questions:

4 x 15 = 60

26. a. Discuss in detail any two applications of infrared spectroscopy. (10+5)
- b. Comment on the selection rules for microwave spectroscopy.
27. a. Explain the following (i) Raleigh scattering (ii) Raman scattering (iii) Stokes and Anti-stokes lines. (10)
- b. Explain pre-dissociation in electron
28. a. Derive the second order rate constant for a bimolecular reaction wherein the reactant are dissimilar. (10)
- b. What is pseudo first order reaction? Give examples.
29. a. Discuss its detail the Absolute Reaction Rate Theory. Mention the limitations of collision theory. (10)
- b. Write short note on (i) Parallel reaction
(ii) consecutive reaction. (5)
30. a. Derive Michaelis menten equation and discuss the conditions for the need of Lineweaver Burk and Eadie Hofstee plots for calculating Menten constant. (12)
- b. Differentiate Physisorption and Chemisorptions. (3)
