22U520

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2024

(CBCSS - UG)

(Regular/Supplementary/Improvement)

CC19U CHE5 B08 - PHYSICAL CHEMISTRY - II

(Chemistry - Core Course)

(2019 Admission onwards)

Time : 2.00 Hours

Maximum : 60 Marks

Credit : 3

Part A (Short answer questions)

Answer *all* questions. Each question carries 2 marks.

1. What happens to the rate of a reaction with increase in temperature?

2. What is the order for the alkaline hydrolysis of ethyl acetate?

3. Define enthalpy of adsorption.

4. What are the phases in equilibrium at the metastable triple point of the sulphur?

5. Explain the term 'congruent melting point. Give an example of a binary condensed system involving formation of a compound with congruent melting point.

6. Define upper critical solution temperature.

7. Pick out, from among the following, those which would give microwave spectrum: O_2, HCI, NH_3, Cl_2, HCN.

8. State the selection rule for the vibrational transitions of a harmonic oscillator.

9. Explain what is meant by Raman shift.

10. Under what conditions of atomic number and mass number does the spin of a nucleus become (i) half-integral, (ii) zero, and (iii) integral?

11. Sketch the schematic PMR spectrum of dimethyl ether and identify the peak(s).

12. Give an example for chemiluminescence.

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

Answer *all* questions. Each question carries 5 marks.

13. Explain the integrated rate law method for the determination of the order of a reaction.

14. What does the term consecutive reactions mean? Explain with an example.

15. State the phase rule and explain the terms components and degrees of freedom with suitable examples.

16. The volume of nitrogen required at STP to cover the surface of a sample of iron catalyst with a monolayer as determined from the BET plot was found to be 8.15cm³g⁻¹ of the adsorbent. The area occupied by one nitrogen molecule is 16.2×10^{-20} m². Calculate the surface area per gram of the iron catalyst.

17. Briefly mention three types of spectroscopic techniques indicating the type of transitions involved and the kind of radiation that cause them.

18. Briefly mention the applications of ESR spectroscopy.

19. Distinguish between the terms absorbance and transmittance.

(Ceiling: 30 Marks)

Part C (Essay questions)

Answer any *one* question. The question carries 10 marks.

20. Discuss the phase diagram of ferric chloride-water system.

21. Discuss the various applications of electronic spectroscopy.

(1 × 10 = 10 Marks)

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