

D 11177

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Name.....

Reg. No.....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2016

(CUCBCSS-UG)

Chemistry/Polymer Chemistry/Industrial Chemistry

CHE 5B 08—PHYSICAL CHEMISTRY—II

Time : Three Hours

Maximum : 80 Marks

Section A

Answer all questions.

Each question carries 1 mark.

1. Name an internal reference used in NMR spectroscopy.
2. Express wave length of a radiation 10 \AA in centimeter unit.
3. Give an example for a molecule belonging to C_{3v} point group.
4. A shift towards shorter wave length in the electronic spectral absorption is called _____.
5. Mention the number of phases present in mixture of He_2 , O_2 and N_2 .
6. The unit zero order reaction is _____.
7. The condition for a molecular to give rotational spectrum is _____.
8. The minimum vibrational energy of a molecule is _____.
9. Give an example for a symmetric top molecules.
10. Name a non-radiative transition.

(10 × 1 = 10 marks)

Section B

Answer any ten questions.

Each question carries 2 marks.

11. What are protective colloids ? Give one example.
12. Explain efflorescence with an example.
13. What is congruent melting point ? Give one example.
14. Explain Hardy Schulze rule with suitable example.
15. Explain improper axis of rotation with an example.
16. Can the activation energy of a reaction be zero or negative ? Explain your answer.
17. Define molar extinction coefficient. What is its significance ?
18. Distinguish between order and molecularity.
19. What is meant by zero order reaction ? Give one example.

Turn over

20. What is meant by half life time of a reaction ? Give the expression for the half life time of a first order reaction.
21. The half life time of a first order reaction is 470 s. Calculate the rate constant for the reaction.
22. What is Born-Oppenheimer approximation ?

(10 × 2 = 20 marks)

Section C

*Answer any five questions.
Each question carries 6 marks.*

23. Discuss the use of half life method for the determination of order of a reaction.
24. Derive Langmuir adsorption isotherm. How will you correlate it with Freundlich isotherm ?
25. Explain gas chromatography.
26. Explain briefly the origin of Raman spectroscopy.
27. What is Zeta potential ?
28. Discuss Patinsons process of desilverisation of lead.
29. Briefly explain the theory of ESR spectroscopy.
30. Derive an expression for a second order reaction.

(5 × 6 = 30 marks)

Section D

*Answer any two questions.
Each question carries 10 marks.*

31. (a) Explain the theory of NMR spectroscopy.
(b) Discuss the effects of temperature and catalyst on rate of reaction.
- (5 + 5 = 10 marks)
32. (a) Derive Nernst distribution law. Mention important applications of the law.
(b) Calculate the reduced mass and moment of inertia of $^{79}\text{BrCl}^{35}$ molecule. The bond length of the molecule is 0.214 nm.
- (6 + 4 = 10 marks)
33. (a) What are the postulates of collision theory ? Using the theory, derive an expression for the rate of a bimolecular reaction.
(b) Write a note on applications of colloids.
(c) Explain electrophoresis.
- (5 + 3 + 2 = 10 marks)
34. (a) Discuss the Lindemann theory of unimolecular reactions.
(b) Write a note on high performance liquid chromatography.
(c) Write a note on chemiluminescence.

(5 + 3 + 2 = 10 marks)

[2 × 10 = 20 marks]