

(6 pages)

Reg. No. : .....

Code No. : 10324 E Sub. Code : AMCH 62

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023.

Sixth Semester

Chemistry – Core

PHYSICAL CHEMISTRY – III

(For those who joined in July 2020 only)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

- The two main factors that affect absorbance are  
(a) Concentration  
(b) Path length  
(c) Intensity  
(d) Concentration of the substance and path length
- How many modes of vibration are found in H<sub>2</sub>O?  
(a) 1 (b) 6  
(c) 3 (d) 0

- H<sub>2</sub> is  
(a) IR active (b) Raman active  
(c) Raman inactive (d) IR inactive
- CO is  
(a) IR active (b) Raman active  
(c) Raman inactive (d) IR inactive
- A example for symmetry operator is  
(a) Inversion operation  
(b) Mirror plane  
(c) Improper rotation  
(d) All the above
- C<sub>2v</sub> is a point group of  
(a) NH<sub>3</sub> (b) H<sub>2</sub>O  
(c) H<sub>2</sub>S (d) NO
- The unit of first order reaction rate constant is  
(a) Sec<sup>-1</sup> (b) Sec  
(c) Joule (d) Joule<sup>-1</sup>
- The reaction of hydrogen with chlorine belongs to  
(a) First order (b) Zero order  
(c) Second order (d) Third order

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- Absorption of nitrogen on the surface of charcoal at lower temperature is  
(a) Chemisorption (b) Absorption  
(c) Physisorption (d) All the above
- Benzene and toluene is an example for  
(a) Ideal solution  
(b) Non ideal solution  
(c) Positive deviation  
(d) Negative deviation

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

- (a) Write on various types of molecular spectra.  
Or  
(b) List out the factors affecting absorption maximum and intensity.
- (a) Write a note on energy level splitting in ESR spectroscopy.  
Or  
(b) Discuss on Kramer's degeneracy.

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- (a) Explain H<sub>2</sub>O and NH<sub>3</sub> point groups.  
Or  
(b) Explain Abelian and cyclic groups.
- (a) List out the characteristics of third order reaction.  
Or  
(b) Describe on second order reactions with examples.
- (a) List out the applications of absorption.  
Or  
(b) Write a note on Azeotropic distillation.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

- (a) Explain. Born oppenheimer approximation.  
Or  
(b) (i) Discuss on the types of transitions in molecules. (5)  
(ii) Write a short note on moment of inertia. (3)

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[P.T.O.]

17. (a) Discuss on the following :  
(i) Coupling constants (4)  
(ii) Zero field splitting. (4)  
Or  
(b) Write a note on the following :  
(i) Chemical shift (4)  
(ii) Applications of NMR. (4)
18. (a) Explain  
(i) Planes of symmetry (4)  
(ii) Types of planes. (4)  
Or  
(b) Discuss on the following  
(i) Improper rotational axis of symmetry. (5)  
(ii) Identity elements. (3)
19. (a) (i) How will you determine the order of a reaction? (5)  
(ii) Differentiate order from molecularity of a reaction. (3)  
Or  
(b) Explain the following :  
(i) Energy of activation (4)  
(ii) Determination of Arrhenius frequency factor. (4)

20. (a) (i) Differentiate physisorption from chemisorptions. (5)  
(ii) Write a note on critical solution temperature. (3)  
Or  
(b) (i) Discuss on ideal and non ideal solutions with examples. (4)  
(ii) Write a note on adsorption indicators. (4)
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