



**NAVVRACHANA
UNIVERSITY**

a UGC recognized University

School: School of Science
Program: B.Sc. in Chemistry
Year: 3rd **Semester:** V
Examination: End Semester Examination
Examination year: December - 2021

Course Code: CH302 **Course Name:** Phase Equilibria, Chemical Kinetics & Catalysis
Date: 06/12/2021 **Total Marks:** 40
Time: 11:30 am to 13:30 pm **Total Pages:** 3

Instructions:

- Write each answer on a new page.
- Use of a calculator is ~~not~~ required.
- * COs=Course Outcome mapping. # BTL=Bloom's Taxonomy Level mapping

Q. No.	Details	Marks	COs*	BTL#
Q.1	<p>Answer the following (Any two)</p> <p>1) A skater can skate easily on the surface of ice rink and cooking is more efficient in a pressure cooker. Justify.</p> <p>2) Unwanted moisture can be removed from the drug/protein/enzyme sample. Justify.</p> <p>3) Define the terms adsorption and absorption. Distinguish between chemical adsorption and physical adsorption. Discuss the various applications of adsorption in industry and in everyday life.</p>	6	CO1, CO2, CO5	BT1, BT2, BT3, BT4, BT5
Q.2	<p>Chose the most appropriate answer from the options provided</p> <p>A. What is the name of the phase transition that occurs when a solid is converted directly into a gas (without going through the liquid phase)?</p> <p>a) Melting b) Boiling c) Sublimation d) Condensation</p> <p>B. On a two component solid-liquid phase diagram, an isopleth indicates which of the following?</p> <p>a) A region where the temperature is constant b) An area below which only the solid phase exists c) An area above which only the liquid phase exists d) A region where the composition of the system is constant</p> <p>C. A mixture of two immiscible liquids, water and benzene constitutes a system having number of phases equal to</p>	8	CO1, CO2, CO3, CO4	BT1, BT2, BT3, BT4, BT5

	<p>E. Draw neatly the phase diagram of a simple eutectic system (two component system) and label the regions. Define: Eutectic Point, Eutectic Composition and Eutectic Temperature. Explain the significance of this diagram in separation of metals from their mixture.</p>															
<p>Q.4</p>	<p>Answer the following.</p> <p>1) The rate of reaction is doubled when the temperature is changed from 298 K to 308 K. Calculate the energy of activation of the reaction.</p> <p>2) 5 ml of Methyl acetate was added to a flask containing 100 ml of 0.1M HCl placed in a thermostat water bath maintained at 303 K. 5 ml of the reaction mixture was withdrawn at different time intervals and after chilling, titrated against a standard solution of sodium hydroxide. The following data were obtained:</p> <table border="1" data-bbox="236 779 1313 898"> <tr> <td>Time (minutes)</td> <td>0</td> <td>75</td> <td>120</td> <td>180</td> <td>∞</td> </tr> <tr> <td>ml of NaOH used</td> <td>9.6</td> <td>12.1</td> <td>13.1</td> <td>14.8</td> <td>21.1</td> </tr> </table> <p>From the above data, prove that the hydrolysis of methyl acetate is a first-order reaction.</p>	Time (minutes)	0	75	120	180	∞	ml of NaOH used	9.6	12.1	13.1	14.8	21.1	<p>6</p>	<p>CO3, CO4</p>	<p>BT1, BT2, BT3, BT4, BT5</p>
Time (minutes)	0	75	120	180	∞											
ml of NaOH used	9.6	12.1	13.1	14.8	21.1											

*****End of Question Paper*****