



# ARSD College, University of Delhi

## Model Course Handout/Lesson Plan

Course Name : B.Sc. (Hons) Chemistry						
Semester	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
III	CHEMISTRY - CVII: PHYSICAL CHEMISTRY -III	Phase Equilibria and Electrochemical Cells	0	0	4	2
Teacher/Instructor(s)		Vishnu Kumawat, Dr. Meenakshi Gupta				
Session		2022-23				

### Course Description:

The aim of this course is to make students understand phase, co-existence of phases, phase diagram, CST and distribution law and concepts of electrochemical cells, electrode potential, electrochemical series and learn about surface phenomenon, adsorption isotherms, BET Equation.

Learning Outcomes: By the end of the course, students will be able to: • Understand phase equilibrium, criteria, CST, Gibbs-Duhem-Margules equation. • Learn the working of electrochemical cells, galvanic cell, corrosion and happenings in surroundings related to electrochemistry.

### List of Experiments:

#### Phase Equilibria:

1. Determination of critical solution temperature and composition at CST of the phenol water system and to study the effect of impurities of sodium chloride and succinic acid on it.
2. Phase equilibria: Construction of the phase diagram using cooling curves or ignition tube method: a. simple eutectic and b. congruently melting systems.
3. Distribution of acetic/ benzoic acid between water and chloroform or cyclohexane.
4. Study of equilibrium of any one of the following reactions by distribution method: (a)  $I_2(aq) + I^-(aq) \rightleftharpoons I_3^-(aq)$  (b)  $Cu^{2+}(aq) + nNH_3 \rightleftharpoons [Cu(NH_3)_n]^{2+}$

#### Potentiometry:

1. Perform the following potentiometric titrations: i. Strong acid vs. strong base ii. Weak acid vs. strong base iii. Dibasic acid vs. strong base iv. Potassium dichromate vs. Mohr's salt.

Details of the Lab Course		
Session	Name of Experiment	Contact Hours
1	Issue of Apparatus	4
2	Determination of critical solution temperature and composition at CST of the phenol water system and to study the effect of impurities of sodium chloride and succinic acid on it.	4
3	Determination of critical solution temperature of phenol impure water system to study the effect of impurity of sodium chloride on it.	4
4	Determination of critical solution temperature of phenol impure water system to study the effect of impurity of succinic acid on it.	4
5	To draw the cooling curves for simple eutectic systems.	4
6	To draw the phase diagram for simple eutectic systems.	4
7	To draw the cooling curves for congruent systems.	4
8	To draw the phase diagram for congruent systems.	4
9	To study distribution of acetic acid between water and chloroform	4
10	Study of equilibrium of the following reaction by distribution method: $I_2(aq) + I^-(aq) \rightleftharpoons I_3^-(aq)$	4
11	Perform the potentiometric titration of Strong acid vs. strong base.	4
12.	Perform the potentiometric titrations of Weak acid vs. strong base.	4
13	Perform the potentiometric titration of Dibasic acid vs. strong base.	4
14.	Perform the potentiometric titration of Potassium dichromate vs. Mohr's salt.	4
15	Mock test	4
<b>Total</b>		<b>60</b>
<b>Suggested Books:</b>		
Sl. No.	Name of Authors/Books/Publishers	Year of Publication/Reprint
1.	Khosla, B.D.; Garg, V.C.; Gulati, A., Senior Practical Physical Chemistry, R. Chand & Co, New Delhi.	2015
2.	Kapoor, K.L., A Textbook of Physical Chemistry, Vol.7, 1st Edition, McGraw Hill Education.	2019

3.	Garland, C. W.; Nibler, J. W.; Shoemaker, D. P., Experiments in Physical Chemistry, 8th Edition, McGraw-Hill, New York.	2003
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**Evaluation Scheme:**

No.	Component	Duration	Marks
1.	Internal Assessment		20
	• Quiz/Viva		
	• Observation & Record		
	• Attendance		
	• Model Exam		
2.	End Semester Examination	5 hrs	30

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