

Based on Latest syllabus of
Rajasthan Technical University, Kota and other Universities



Engineering Chemistry

(Semester - II)

SURESH C. AMETA

YASMIN

SHIPRA BHARDWAJ

CHETNA GOMBER

KIRAN DURGAWAT

ABOUT THE BOOK

This book deals with the First year II Semester B.Tech. Program of Rajasthan Technical University, Kota and other Universities of Rajasthan. Basics of various topics have been given alongwith applications, in a language which is easy to understand. Solved and unsolved numerical problems are given in the relevant chapters. Question asked in different Years/ Exams are given at the end of each chapter.

ABOUT THE AUTHORS

Professor SURESH C. AMETA is Former Professor & Head of Chemistry and Dean, Post-Graduate Studies, Mohanlal Sukhadia University, Udaipur (Raj.). He has Thirty Eight years experience of teaching and research. He has successfully guided 56 Ph.D. Students and published more than 250 research papers in Journals of National and International repute. He has received number of awards in his career and served on the coveted position of President, Indian Chemical Society, Kolkata (2000-01).

Dr. YASMIN is working as Professor, Department of Chemistry, Techno-India NJR Institute of Technology, Udaipur (Raj.). She has Eleven years of teaching experience. She has three books on Engineering Chemistry and Environmental Science & Engineering to her credit.

Dr. SHIPRA BHARDWAJ is working as Sr. Lecturer, Department of Chemistry, M.P. Govt. P.G. College, Chittorgarh (Raj.). She has Ten years of teaching experience. She has two books on Environmental Science to her credit.

Dr. CHETNA GOMBER is working as Associate Professor & Head, Department of Chemistry, Jodhpur Institute of Engineering & Technology, Jodhpur (Raj.). She has Ten years of teaching experience.

Dr. KIRAN DURGAWAT is working as Assistant Professor & Head, Department of Chemistry, Shrinathji Institute of Technology & Engineering Upli Oden, Nathdwara (Raj.). She has Five years of teaching experience.

ALSO OF INTEREST

Basic Physics – Kalra, Saraswat & Singh

Basic Mathematics – Purohit & Saraswat

Physics for Engineers (Semester-I) – Saraswat & Jain

Engineering Physics (Semester I & II) – Saraswat & Jain

Practical Physics – Venugopalan & Saraswat

Engineering Mechanics – Trilok Gupta

Power Electronics (with MATLAB) – Kumar, Joshi & Bansal

Practical Engineering Chemistry (Semester-I) – Ameta, Yasmin, Bhardwaj, Gomber & Vyas

Engineering Chemistry (Semester I & II) – Ameta, Yasmin, Bhardwaj, Gomber & Durgawat

Engineering Chemistry (Semester - II) – Ameta, Yasmin, Bhardwaj, Gomber & Durgawat

A Course In Electrical and Electronics Engineering – Gupta, Jain & Paneri

Digital Electronics – Saraswat

Basic Environmental Engineering – Ameta, Durgawat, Mehta, Vyas & Sharma

Rs. 150.00

ISBN: 978-81-7906-21-6



HIMANSHU PUBLICATIONS

464, Sector 11, Hiran Magni, UDAIPUR-1 (Raj.) INDIA ☎: 0294-3296979, Fax: 0294-2523086

4379/4-B, Prakash House, Ansari Road, Daryaganj, New Delhi-2, ☎: 011-23255920, 32551896

e-mail: himanshupublications@gmail.com; web: www.himanshupublications.com

Contents

UNIT - I

CHAPTER 01

FUELS: GENERAL ASPECTS

INTRODUCTION	1
ORGANIC FUELS	1
Origin of Organic Fuels	1
Classification and General Aspects of Organic Fuels	2
Characteristics of a Good Fuel	5
SOLID FUELS	5
1. Natural Solid Fuels	5
Coal	6
Origin of Coal	6
Metamorphosis of peat to coal	6
2. Artificial Solid Fuel	10
3. Briquettes :	11
LIQUID FUELS	16
Petroleum	17
Classification of Petroleum	17
Origin of Petroleum	17
Mining of Petroleum	18
Refining of Petroleum	19
Cracking	22
Synthetic Petrol (Coal to Liquid (CTL) Technology)	26
Refining of Gasoline	28
Reforming of Gasoline	28
Petrochemicals	30
Knocking	31
Octane Number	32

Cetane Number	34
Other Liquid Fuels	34
GASEOUS FUELS	34
1. Natural Gas	36
2. Coal Gas	36
3. Oil Gas	36
4. Producer Gas	37
5. Water Gas	38
6. Biogas	39
QUESTIONS	39
EXAMINATION QUESTIONS	41
42	
UNIT - II	
CHAPTER 02	
FUELS: ANALYSIS	44
CALORIFIC VALUE	44
Determination of Calorific Value of Solid and Non-volatile Liquid Fuels by Bomb Calorimeter	45
Determination of Calorific Value of Gaseous Fuels and Volatile Liquid Fuels by Junker's Calorimeter	49
DULONG'S FORMULA	52
Analysis of Coal	53
Analysis of Flue Gases (Orsat's Apparatus)	60
COMBUSTION	62
SOLVED NUMERICAL PROBLEMS	67
QUESTIONS	77
EXAMINATION QUESTIONS	78
UNSOLVED NUMERICALS	82
UNIT - III	
CHAPTER 03	
PHASE RULE	84
INTRODUCTION	84
Gibbs Phase Rule	88
APPLICATIONS OF PHASE RULE	91

WATER SYSTEM	92
SULPHUR SYSTEM	95
TWO COMPONENT SYSTEM	98
Lead-silver (Pb-Ag) System	99
Cadmium-Bismuth System	102
Application to Pattinson's Process	103
Uses of Phase Rule	104
Limitations of Phase Rule	105
QUESTIONS	105
EXAMINATION QUESTIONS	106
UNIT - IV	
CHAPTER 04	
NEW ENGINEERING MATERIALS	108
INTRODUCTION	108
1. Superconductors	108
2. Organic Electronic Materials	116
3. Fullerenes	123
4. Optical fibre	125
QUESTIONS	133
EXAMINATION QUESTIONS	134
UNIT - IV	
CHAPTER 05	
CORROSION	136
INTRODUCTION	136
THEORIES OF CORROSION	137
GALVANIC SERIES	149
FACTORS AFFECTING CORROSION	150
PROTECTION AGAINST CORROSION	153
METHODS OF COATINGS	157
QUESTIONS	159
EXAMINATION QUESTIONS	160