

# BASIC INORGANIC CHEMISTRY



**DR. PARAMITA MAJUMDER**

Kripa Drishti Publications, Pune.

# **BASIC INORGANIC CHEMISTRY**

**Editor**

**Dr. Paramita Majumder**

**Kripa-Drishti Publications, Pune.**

Book Title: **Basic Inorganic Chemistry**

Editor By: **Dr. Paramita Majumder**

Authored By: **Dr. Shubhendu Dhara, Mrs. Nivedita. N. Hiremath,  
Mrs. Pratiksha Akki, Dr. Kusum S. Akki,  
Dr. Shivakumar Belur, Akshata S. Menasinakai,  
Dr. Aryaa A. Ankalikar, Dr. Pradeepkumar M. Ronad,  
Avijit Sarkar, Meena Rani, Dr. Basu Maan Daas,  
Nazima Sultana, Mehdi Al. Kausor,  
Dr. Rituparna Biswas**

**Price: ₹299**

1<sup>st</sup> Edition

ISBN: **978-81-19149-01-8**



Published: **May 2023**

**Publisher:**



**Kripa-Drishti Publications**

A/ 503, Poorva Height, SNO 148/1A/1/1A,  
Sus Road, Pashan- 411021, Pune, Maharashtra, India.

Mob: +91-8007068686

Email: [editor@kdpublications.in](mailto:editor@kdpublications.in)

Web: <https://www.kdpublications.in>

© **Copyright Dr. Paramita Majumder**

All Rights Reserved. No part of this publication can be stored in any retrieval system or reproduced in any form or by any means without the prior written permission of the publisher. Any person who does any unauthorized act in relation to this publication may be liable to criminal prosecution and civil claims for damages. [The responsibility for the facts stated, conclusions reached, etc., is entirely that of the author. The publisher is not responsible for them, whatsoever.]

## PREFACE

Basic The study of the synthesis, reactions, structures, and properties of elemental compounds is known as inorganic chemistry. Inorganic chemistry includes everything else in the periodic table's compounds, both molecular and extended solids, and overlaps with organic chemistry in the area of organometallic chemistry, in which metals are bonded to carbon-containing ligands and molecules. Many practical technologies rely on inorganic chemistry, such as catalysis and materials (structural, electronic, magnetic, and so on), energy conversion and storage, and electronics. Inorganic compounds can also be found in biological systems, where they play an important role in life processes.

The book's goal is to introduce students to the fundamental concepts of inorganic chemistry and show where they come from. It begins with chemical observations and grows ideas from them. It supplements texts that begin with quantum theory of atoms and molecules and progress to a more physical approach.

This edited book of **Basic Inorganic Chemistry** begins with a focus on facts and then builds on the student's growing factual knowledge to discuss the important principles of periodicity in structure, bonding, and reactivity. This book includes separate chapters on the following subjects:

1. Covalent Bonding
2. Classification of Elements Periodicity in Properties
3. Coordinate Bonding
4. Redox Chemistry
5. Application and Research Areas of Coordination Compounds in Inorganic Chemistry
6. Concept of Hard and Soft Acids and Bases
7. Acids and Bases
8. Revisiting the Fundamentals of Acid-Base Chemistry

# CONTENT

<b>1. Covalent Bonding - Dr. Shubhendu Dhara</b> .....	<b>1</b>
1.2 Types of Covalent Bonds:.....	6
1.2.1 Single Bonds:.....	7
1.2.2 Double bonds:.....	8
1.2.3 Triple Bonds:.....	9
1.2.4 Polar Covalent Bonds:.....	10
1.3 Characteristics of Covalent Compounds:.....	11
1.4 Reference:.....	15
<b>2. Classification of Elements Periodicity in Properties - Mrs. Nivedita. N. Hiremath, Mrs. Pratiksha Akki, Dr. Kusum S. Akki, Dr. Shivakumar Belur</b> .....	<b>16</b>
2.1 Introduction:.....	17
2.2 Classification of Elements and Periodicity in Properties:.....	18
2.3 Limitations of Dobereiner's Triads:.....	19
2.4 Newland's Law of Octaves:.....	19
2.5 Modern Periodic Law:.....	21
2.6 Nomenclature of Elements with Atomic Number (Z) Greater Than 100:.....	23
2.7 Electronic Configuration of Elements:.....	24
2.7.1 How to do Electronic Configuration:.....	25
2.7.2 The electronic configuration of noble gases is:.....	27
2.8 Periodic Properties:.....	28
2.8.1 Conclusion:.....	28
2.9 Periodic Trends in Properties of Elements:.....	29
2.10 Conclusion:.....	31
2.11 References:.....	31
<b>3. Coordinate Bonding - Akshata S. Menasinakai, Dr. Aryaa A. Ankalikar, Dr. Pradeepkumar M. Ronad</b> .....	<b>32</b>
3.1 Covalent Bond:.....	32
3.2 Types of Covalent Bonds:[3].....	34
3.3 Characteristics of Covalent bond:[2].....	37
3.4 Conclusion:.....	38
3.5 References:.....	38
<b>4. Redox Chemistry - Avijit Sarkar</b> .....	<b>39</b>
4.1 Introduction:.....	39
4.2 Concept of Redox Reaction:.....	39
4.3 Rules for Calculating Oxidation Number of an Element:.....	41

4.4 Conclusion: .....	46
4.5 References:.....	46
<b>5. Application and Research Areas of Coordination Compounds in Inorganic Chemistry - Meena Rani .....</b>	<b>47</b>
5.1 Introduction:.....	47
5.2 Classification of Coordination Compounds:.....	48
5.3 Types of Coordination Compounds: .....	52
5.4 Application of Coordination Compounds:.....	53
5.5 Research Areas in Inorganic Coordination Compounds: .....	55
5.6 Conclusion: .....	57
5.7 References:.....	57
<b>6. Concept of Hard and Soft Acids and Bases - Dr. Basu Maan Daas .....</b>	<b>59</b>
6.1 Introduction:.....	59
6.2 Arrhenius Concept:.....	59
6.2.1 Advantages of Arrhenius Concept: .....	60
6.3 Bronsted-Lowry Concept:.....	61
6.3.1 Conjugate Acid-Base Pairs:.....	62
6.3.2 Advantages of Bronsted-Lowry Concept: .....	63
6.4 Lewis Concept:.....	64
6.4.1 Advantages of Lewis Concept: .....	65
6.5 Solvent System Concept: .....	66
6.5.1 Advantages of Solvent System Concept: .....	68
6.5.2 Limitations of Solvent System Concept:.....	68
6.6 HSAB Concept:.....	69
6.6.1 Advantages of HSAB concept:.....	70
<b>7. Acids and Bases - Nazima Sultana, Mehdi Al. Kausor .....</b>	<b>72</b>
7.1 Introduction:.....	73
7.2 Concept of Acids and Bases: .....	73
7.2.1 Arrhenius Concept: .....	73
7.2.2 Brønsted-Lowry Concept: .....	75
7.2.3 Lewis Concept: .....	76
7.2.4 More Other Concept of Acids-Bases: .....	78
7.3 Hard and Soft Acids and Bases (HSAB): .....	79
7.3.1 Pearson's Concept:.....	80
7.3.2 HSAB Principle and It's Application:.....	80
7.4 Measurement of Acid-Base Strength: .....	81
7.4.1 Ionization of Acids and Bases: .....	82
7.5 Strength of Acids and Bases: .....	89
7.5.1 Polarity of bonds and electronegativity: .....	89
7.5.2 Size of the atoms and bond dissociation energy: .....	90
7.5.3 Oxidation State of the Central Atom .....	90

7.5.4 Type of Substituent: .....	91
7.5.5 Nature of Solvent or Levelling Effect: .....	92
7.6 Conclusion: .....	93
7.7 References: .....	93

## **8. Revisiting the Fundamentals of Acid-Base Chemistry -**

<i>Dr. Rituparna Biswas</i> .....	<b>95</b>
-----------------------------------	-----------

8.1 Arrhenius Concept: .....	96
8.2 Bronsted–Lowry Concept:.....	97
8.3 Lewis Concept of Acids and Bases: .....	101
8.4 Solvent System Concept: .....	103
8.5 Hard-Soft Acid-Base Concept:.....	105
8.6 References:.....	110



**KRIPA DRISHTI  
PUBLICATIONS**

**Kripa-Drishti Publications  
A-503 Poorva Heights, Pashan-Sus Road, Near Sai Chowk,  
Pune - 411021, Maharashtra, India.  
Mob: +91 8007068686  
Email: [editor@kdpublications.in](mailto:editor@kdpublications.in)  
Web: <https://www.kdpublications.in>**

**Price: ₹ 299**

**ISBN: 978-81-19149-01-8**



9 788119 149018