



CHEMISTRY OF MAIN GROUP ELEMENTS

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PRE-REQUISITES : 12th Grade Chemistry Knowledge

INTENDED AUDIENCE : Students, PhD scholars, teachers, industry

INDUSTRIES APPLICABLE TO : This course is very useful for those working in Pharmaceutical Industries.

COURSE OUTLINE :

This course on Chemistry of Main Group Elements focuses on the chemistry of s- and p-block elements, structure and bonding concepts and systematic understanding of their chemical reactivity. Organometallic chemistry of main group elements with special emphasis on their applications in organic synthesis is also included in the discussion. Various applications of main group elements and their compounds is also added into the lectures.

ABOUT INSTRUCTOR :

Prof. M.S. Balakrishna joined the department of chemistry in 1996. Taught Transition metal chemistry, coordination chemistry, interpretative molecular spectroscopy, organometallic chemistry of main group elements to UG, PG and Ph.D. scholars. Research interests: Main group and transition metal chemistry, organophosphorus chemistry, homogeneous catalysis and biological applications of copper(I) complexes. Published 210 research papers, five book chapters, edited a book on copper(I) complexes of phosphines (Elsevier) and has delivered more than 500 invited lectures. Balakrishna has supervised 23 PhD students, several M.Sc. students and postdoctoral fellows.

COURSE PLAN :

Week 1 : Lecture 1 : Classification of Elements and Periodic Properties

Lecture 2 : Periodic Properties, Periodic Trends and Classification of main group Compounds

Lecture 3 : Classification of Main Group Compounds

Lecture 4 : Effective Nuclear Charge

Lecture 5 : Structure and Bonding aspects: Lewis Structures and VSEPR Theory

Week 2 : Lecture 6 : Structure and Bonding aspects: VSEPR Theory

Lecture 7 : Structure and Bonding aspects: Valence Bond Theory

Lecture 8 : Structure and Bonding aspects: Valence Bond Theory (contd...)

Lecture 9 : Structure and Bonding aspects: MO Theory

Lecture 10 : Structure and Bonding aspects: MO Theory (contd...)

Week 3 : Lecture 11 : Structure and Bonding aspects: MO Theory (contd...)

Lecture 12 : Structure and Bonding aspects : MO Theory (contd...)

Lecture 13 : Chemistry of Hydrogen

Lecture 14 : Chemistry of Hydrogen (contd...)

Lecture 15 : Chemistry of Hydrogen, Hydrides and Hydrogen Bonding

Week 4 : Lecture 16 : Chemistry of Group 1 elements

Lecture 17 : Chemistry of Group 1 elements (contd...)

Lecture 18 : Chemistry of Group 1 elements (contd...)

Lecture 19 : Chemistry of Group 1 elements (contd...)

Lecture 20 : Chemistry of Group 2 elements

Week 5 : Lecture 21 : Chemistry of Group 2 elements (contd...)

Lecture 22 : Chemistry of Group 2 elements (contd...)

Lecture 23 : Chemistry of Group 2 elements (contd...)

Lecture 24 : Chemistry of Group 2 elements (contd...)

Lecture 25 : Chemistry of Group 13 elements

Week 6 : Lecture 26 : Chemistry of Group 13 elements (contd...)

Lecture 27 : Chemistry of Group 13 elements (contd...)

Lecture 28 : Chemistry of Group 13 elements (contd...)

Lecture 29 : Chemistry of Group 13 elements (contd...)

Lecture 30 : Wades Rules

- Week 7** :Lecture 31 : Chemistry of Group 13 elements
Lecture 32 : Chemistry of Group 14 elements
Lecture 33 : Chemistry of Group 14 elements (contd...)
Lecture 34 : Chemistry of Group 14 elements (contd...)
Lecture 35 : Chemistry of Group 14 elements (contd...)
- Week 8** :Lecture 36 : Chemistry of Group 14 elements (contd...)
Lecture 37 : Chemistry of Group 14 elements (contd...)
Lecture 38 : Chemistry of Group 14 elements (contd...)
Lecture 39 : Chemistry of Group 15 elements
Lecture 40 : Chemistry of Group 15 elements (contd...)
- Week 9** :Lecture 41 : Chemistry of Group 15 elements (contd...)
Lecture 42 : Chemistry of Group 15 elements (contd...)
Lecture 43 : Chemistry of Group 15 elements (contd...)
Lecture 44 : Chemistry of Group 15 elements (contd...)
Lecture 45 : Chemistry of Group 15 elements (contd...)
- Week 10** :Lecture 46 : Chemistry of Group 15 elements (contd...)
Lecture 47 : Chemistry of Group 16 elements
Lecture 48 : Chemistry of Group 16 elements (contd...)
Lecture 49 : Chemistry of Group 16 elements (contd...)
Lecture 50 : Chemistry of Group 16 elements (contd...)
- Week 11** :Lecture 51 : Chemistry of Group 16 elements (contd...)
Lecture 52 : Chemistry of Group 17 elements
Lecture 53 : Chemistry of Group 17 elements (contd...)
Lecture 54 : Chemistry of Group 18 elements
Lecture 55 : Chemistry of Group 12 elements
- Week 12** :Lecture 56 : Organometallic Compounds of Main Group Elements
Lecture 57 : Organometallic Compounds of Main Group Elements (contd...)
Lecture 58 : Organometallic Compounds of Main Group Elements (contd...)
Lecture 59 : Organometallic Compounds of Main Group Elements (contd...)
Lecture 60 : Overall Summary