PARVATHANENI BRAHMAYYA
SIDDHARTHA COLLEGE OF ARTS & SCIENCE
*Autonomous*
Siddhartha Nagar, Vijayawada–520010
***Re-accredited at 'A+' by the NAAC***

**22CH4M3:MOOCs – CHEMISTRY OF MAIN GROUP ELEMENTS**

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|---|---|---|---|
| Course Code | 22CH4M3 | I A Marks | 30 |
| No. of Lecture Hours / Week | 4 | End Exam Marks | 70 |
| Total Number of Lecture Hours | 60 | Total Marks | 100 |
| Seminar | - | Exam Hours | 03 |

| S.No | COURSE OUTCOMES | PO`S |
|---|---|---|
| | The student will be able to | |
| 1 | Memorize the fundamental concepts of chemistry of main group elements. | 2,7 |
| 2 | Comprehend the basic and advanced Concepts of chemistry of main group elements. | 1,2,7 |
| 3 | Apply the Conceptual knowledge gained in the study of chemistry of main group elements as and when required. | 1, 6 |
| 4 | Analyze the role of chemistry of main group elements in establishing the structure and bonding, chemicalproperties, characteristics of group elements. | 1, 7 |
| 5 | Assess the scope and need of chemistry of main group elements in understanding the other concepts of chemistry in allied fields. | 1, 7 |

| **CO-PO MATRIX** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **COURSE CODE 22CH4M3** | CO-PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
| | CO1 | | H | | | | | M |
| | CO2 | M | M | | | | | L |
| | CO3 | H | | | | | M | |
| | CO4 | H | | | | | | M |
| | CO5 | H | | | | | | M |

## Unit -1

**Classification of Elements and Periodic Properties**: periodic trends, classifications of main group elements, Effective Nuclear Charge, Structure and Bonding aspects, VSEPR theory, valency Bond theory, (Mo)Molecular orbital theory, Hybridization, Homonuclear diatomic molecules, heteronuclear diatomic molecules, Molecular orbital theory for poly atomic molecules.

## Unit – 2

**Chemistry of Hydrogen** :Hydrides and Hydrogen Bonding, Hydrates and Clathrates, covalent hydrides, salane hydrides, transition metal hydrides, chemistry of Group-I elements (Li,Na,K,Ru,& Ce),Binary compounds, Hydroxides, Ionic salts, complexation of cations by crown and cryptates, Chemistry of Group –II elements, electro negativity, physical and chemical properties, Electronic configurations.

## Unit – 3

**Chemistry of Group 13 Elements** :Occurance,isolation and properties of the elements, oxides, coordination compounds, lower valent compounds. Introduction to chemistry of Group-14 Elements, physical properties of diamond, Graphite, Fullerenes and Carbides, carbon monoxide cyanides and related compounds, compounds with C-S bond, chemistry of group –I elements.(Al,Ga,Ta&Si,Ge,Sn,Pb)

## Unit - 4

**Chemistry of Group-15 Elements** : Multiple bonding stereochemistry, Isolation and properties of the elements,complex compounds, Hydrides, Halides, oxohalides ,Oxides, Sulfides, Phosphorous-Nitrogen compounds, Compounds with Element-Element double bond, Nitrides, Nitrogen Hydrides, Nitrogen oxides,Hydrazine,Physical and chemical properties of $15^{th}$,$16^{th}$ and $17^{th}$ group elements.

## Unit - 5

**Organo metallic compounds** :Preparation of organometallic compounds, Lithium Alkyl and Aryls, Organo sodium and organo potassium compounds, Mercuration and oxomercuration, Alkyl and Arylsilicon Halides, Transition metals, Alkene complexes, Notation and electron counting in Alkene and relatedcomplexes, other pi-donar ligands, types of ligands, Cyclopentadienyls,Benzenoid – metal complexes, Alkyne complexes, Allyl Complexes.

**Books & References**


- Advanced Inorganic chemistry, 6th addition 1999, F. A Cotton G.wilkinson, C.A Murillo,
  M. Boch mann, John Wiley and Sons, NewYork.
- Inorganic Chemistry, 3rd addition, 1999, D.F. Shriver, P.W Atkins, oxford university press oxford.
- Inorganic Chemistry $2^{nd}$,$3^{rd}$& $4^{th}$ Edition, C.E HouseCroft and A.G Sharpe pearson pentice Hall.
- Main group Chemistry, 2000 W. Henderson Royal Society of Chemistry, publication Cambridge.

**M.Sc. DEGREE EXAMINATION**

**FOURTH SEMESTER**

**22CH4M3 :: CHEMISTRY OF MAIN GROUP ELEMENTS (MOOCS COURSE)**

**Time: 3 hours** **Maximum Marks: 70**

**SECTION - A** **5X4=20M**

**Answer the following questions.**

1) (a) Explain VSEPR theory in short. (CO-2,L-2)

(OR)

(b) Discuss the classification of elements and periodic trends. (CO-2,L-2)

2) (a) Explain Hydrogen bonding and Chemistry of Hydrogen in short. (CO-2,L-2)

(OR)

(b) Enumarate the physical properties of Group –I Elements. (CO-2,L-2)

3) (a) Write a short note on chemical properties of Carbides. (CO-2,L-2)

(OR)

(b) Give a short note on Fullerenes. (CO-2,L-2)

4) (a) Explain the chemistry of Phosphorous compounds in short. (CO-3,L-3)

(OR)

(b) Discuss the chemical properties of hydrides of 15th group elements. (CO-3,L-3)

5) (a) Discuss chemical properties of organo potassium compounds in brief. (CO-3,L-3)

(OR)

(b) Deliberate the concept of Mercuration in short. (CO-3,L-3)

**SECTION – B** **5X10=50M**

UNIT – 1

6) (a)Discuss on Molecular Orbital Theory in detail. (CO-3,L-3)

(OR)

(b) Discuss the role of Valency bond theory in predicting the structure of molecules. (CO-3,L-3)

UNIT -2

7) (a) Explain the electronic configuration and properties of Group –I elements. (CO-3,L-3)

(OR)

(b)Deliberate the physical and chemical properties of the Group- II Elements. (CO-3,L-3)

UNIT -3

8) (a) Write about Isolation of 13th group elements in detail. (CO-3,L-3)

(OR)

(b) Write an essay on Cyanides and related compounds in 14th group elements.(CO3-L3)

UNIT -4

9) (a) Compare the chemical properties of 15th group elements. (CO-4,L-4)

(OR)

(b) Compare electronic configuration of 16th group elements and their physical properties also. (CO-4,L-4)

UNIT -5

10) (a) Discuss preparation and evaluate the chemical properties of organo metallic compounds. (CO-5,L-5)

(OR)

(b) Assess the Notations &Electron counting in alkenes and related complexes. (CO5-L5)

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