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| **Lesson Plan: April2022 to July 2022** | | **Subject: Chemistry** |
| **Name of the Teacher: Hemant Kumar** | | **Class: B.Sc. IV Semester** |
| **08-04-2022 To**  **16-04-2022** | Electronic structure, oxidation states, ionic radii, lanthanide contraction, complex formation, occurrence and isolation. | |
| **18-04-2022 To**  **23-04-2022** | Lanthanide compounds, General features and chemistry ofactinides, chemistry of separation of **Np**, **Pu** and **Am** from **U**, Comparison of properties of Lanthanides and Actinides and with transition elements. | |
| **25-04-2022 To**  **30-04-2022** | Qualitative & Quantitative Analysis: Solubility & Ionic product, Common ion effect, Chemistry of analysis of various groups of basic radicals: Group I to VI, Theory of precipitation. | |
| **02-05-2022 To**  **07-05-2022** | Co-precipitation,Post- precipitation, purification of precipitates. Chemistry of analysis of various acidic radicals, Chemistry of identification of acid radicals in typical combinations. | |
| **09-05-2022 To**  **14-05-2022** | Chemistry of interference of acid radicals includingtheir removal in the analysis of basic radicals.  Molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, | |
| **16-05-2022 To**  **21-05-2022** | Measurement of IR spectrum, fingerprint region, characteristic absorptions of variousfunctional groups, interpretation of IR spectra of simple organic compounds. Applications of IR spectroscopy in structure elucidation of simple organic compounds. | |
| **23-05-2022 To**  **28-05-2022** | Structure and nomenclature of amines, physical properties. Separation of a mixture of 1o, 2 o, & 3 o amines. Structural features affecting basicity of amines. Preparation of alkyl and aryl amines. | |
| **30-05-2022 To**  **04-06-2022** | Gabrielphthalimide reaction, Hofmann bromamide reaction. Electrophilic aromatic substitution in arylamines, reactions of amines with nitrous acid. | |
| **05-06-2022 To**  **12-06-2022** | **Teaching Break** | |
| **13-06-2022 To**  **18-06-2022** | **Diazonium Salts:** Mechanism of diazotisation, structure of benzene diazonium chloride, Replacement of diazo group by **H**, **OH**, **F**, **Cl**, **Br**, **I**, **NO2** and **CN** groups, reduction of diazonium salts to hyrazines, coupling reaction and its synthetic application. | |
| **20-06-2022 To**  **25-06-2022** | **Nitro Compounds:** Preparation of nitro alkanes and nitro arenes and their chemical reactions. Mechanismof electrophilic substitution reactions in nitro arenes and their reductions in acidic,neutral and alkaline medium. | |
| **27-06-2022 To**  **02-07-2022** | **Aldehydes and Ketones:** Nomenclature and structure of the carbonyl group. Synthesis of aldehydesand ketones with particular reference to the synthesis of aldehydes from acidchlorides, advantage of oxidation of alcohols with chromium trioxide (Sarettreagent), pyridiniumchlorochromate (PCC) and pyridinium dichromate. Physical properties & Comparison of reactivities of aldehydes and ketones. | |
| **04-07-2022 To**  **09-07-2022** | Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations. Condensation with ammonia and its derivatives. Wittig reaction. Mannich reaction. Oxidation of aldehydes, Baeyer–Villiger oxidation of ketones, Cannizzaro reaction. MPV, Clemmensen, Wolff-Kishner, LiAlH4 and NaBH4 reductions. | |

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| **Lesson Plan: April2022 to July 2022** | | **Subject: Chemistry** |
| **Name of the Teacher: Hemant Kumar** | | **Class: B.Sc. IV Semester** |
| **08-04-2022 To**  **16-04-2022** | Electronic structure, oxidation states, ionic radii, lanthanide contraction, complex formation, occurrence and isolation. | |
| **18-04-2022 To**  **23-04-2022** | Lanthanide compounds, General features and chemistry ofactinides, chemistry of separation of **Np**, **Pu** and **Am** from **U**, Comparison of properties of Lanthanides and Actinides and with transition elements. | |
| **25-04-2022 To**  **30-04-2022** | Qualitative & Quantitative Analysis: Solubility & Ionic product, Common ion effect, Chemistry of analysis of various groups of basic radicals: Group I to VI, Theory of precipitation. | |
| **02-05-2022 To**  **07-05-2022** | Co-precipitation,Post- precipitation, purification of precipitates. Chemistry of analysis of various acidic radicals, Chemistry of identification of acid radicals in typical combinations. | |
| **09-05-2022 To**  **14-05-2022** | Chemistry of interference of acid radicals includingtheir removal in the analysis of basic radicals.  Molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, | |
| **16-05-2022 To**  **21-05-2022** | Measurement of IR spectrum, fingerprint region, characteristic absorptions of variousfunctional groups, interpretation of IR spectra of simple organic compounds. Applications of IR spectroscopy in structure elucidation of simple organic compounds. | |
| **23-05-2022 To**  **28-05-2022** | Structure and nomenclature of amines, physical properties. Separation of a mixture of 1o, 2 o, & 3 o amines. Structural features affecting basicity of amines. Preparation of alkyl and aryl amines. | |
| **30-05-2022 To**  **04-06-2022** | Gabrielphthalimide reaction, Hofmann bromamide reaction. Electrophilic aromatic substitution in arylamines, reactions of amines with nitrous acid. | |
| **05-06-2022 To**  **12-06-2022** | **Teaching Break** | |
| **13-06-2022 To**  **18-06-2022** | **Diazonium Salts:** Mechanism of diazotisation, structure of benzene diazonium chloride, Replacement of diazo group by **H**, **OH**, **F**, **Cl**, **Br**, **I**, **NO2** and **CN** groups, reduction of diazonium salts to hyrazines, coupling reaction and its synthetic application. | |
| **20-06-2022 To**  **25-06-2022** | **Nitro Compounds:** Preparation of nitro alkanes and nitro arenes and their chemical reactions. Mechanismof electrophilic substitution reactions in nitro arenes and their reductions in acidic,neutral and alkaline medium. | |
| **27-06-2022 To**  **02-07-2022** | **Aldehydes and Ketones:** Nomenclature and structure of the carbonyl group. Synthesis of aldehydesand ketones with particular reference to the synthesis of aldehydes from acidchlorides, advantage of oxidation of alcohols with chromium trioxide (Sarettreagent), pyridiniumchlorochromate (PCC) and pyridinium dichromate. Physical properties & Comparison of reactivities of aldehydes and ketones. | |
| **04-07-2022 To**  **09-07-2022** | Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations. Condensation with ammonia and its derivatives. Wittig reaction. Mannich reaction. Oxidation of aldehydes, Baeyer–Villiger oxidation of ketones, Cannizzaro reaction. MPV, Clemmensen, Wolff-Kishner, LiAlH4 and NaBH4 reductions. | |

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| **Lesson Plan: April,2022 to July, 2022** | | **Subject: Chemistry** |
| **Name of the Teacher: Hemant Kumar** | | **Class: B.Sc. II Semester** |
| **15-04-2022 To**  **16-04-2022** | Chemistry of **s**-block Elements: Diagonal relationship, anomalous behavior of **Li** & **Be** compared to other elements of same group, Silent features of Hydrides, Hydroxides, Halides & Oxides. Behavior of solution in liquid ammonia | |
| **18-04-2022 To**  **23-04-2022** | Complex formation tendency of **s**-block elements, Structures of crown ether & cryptates of group I.  **Boron Family**: Diborane: Preparation, properties & structure. Borazine: Chemical properties & structure. | |
| **25-04-2022 To**  **30-04-2022** | Relative strength of trihalides of boron as lewis acid, Structure of aluminum (III) chloride.  **Carbon Family**: catenation, carbides, fluorocarbons, silicates, silicones: preparation, properties & uses. | |
| **02-05-2022 To**  **07-05-2022** | **Nitrogen Family**: Oxides: Structure of oxides of Nitrogen & Phosphorous; Oxyacids: structure and relative strength of oxyacids of **N** & **P**, Structure of white, yellow & red **P**. | |
| **09-05-2022 To**  **14-05-2022** | **Oxygen Family:** Oxyacid of sulphur- structure & acidic strength, Hydrogen peroxide: properties & uses.  **Halogen Family:** Interhalogen coumpounds, Hydra acid & oxy acid of Chlorine- structure & comparison of acid strength. | |
| **16-05-2022 To**  **21-05-2022** | Cationic nature of Iodine, **Chemistry of Noble gases:** chemistry of Xenon, Structure & bonding in fluorides, oxides & oxyfluorides of xenon. | |
| **23-05-2022 To**  **28-05-2022** | **Thermodynamics I:** Zeroth law of thermodynamics, First law of thermodynamics: statement, definition of internal energy and enthalpy. Heat Capacity, heat capacities at constant pressure and volume, & their relationship | |
| **30-05-2022 To**  **04-06-2022** | Joule’s law, Joule-Thomson coefficient for Ideal & Real gas and Inversion temperature, Calculation of **w**, **q**, **dU** & **dH** for the expansion of idea gases under isothermal & adiabatic condition for reversible process. | |
| **05-06-2022 To**  **12-06-2022** | **Teaching Break** | |
| **13-06-2022 To**  **18-06-2022** | Temperature dependence of enthalpy, Kirchoffs equation, Bond energies and applications of bond energies. **Thermodynamics II:** Second law of thermodynamics, Carnot’s cycles & its efficiency, Concept of Entropy- Entropy as a state function. | |
| **20-06-2022 To**  **25-06-2022** | Entropy as a function of **V** & **T**, Entropy as a function of **P** & **T**, Entropy change in physical change, Entropy as a criterion of spontaneity and equilibrium, Entropy change in ideal gases and mixing of gases. | |
| **27-06-2022 To**  **02-07-2022** | Third law of thermodynamics, Nernst heat theorem, statement of concept of residual entropy, Evaluation of absolute entropy from heat capacity data. Gibbs & Helmholtz functions: Gibbs function (**G**) & Helmholtz function (**A**) as thermodynamic quantities. | |
| **04-07-2022 To**  **09-07-2022** | **A** & **G** as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change, Variation of **G** & **A** with **P**, **V** & **T.** | |