

Lesson Plan : 2<sup>nd</sup> Sem, Session 2021-22, Inorganic Chemistry

Dr. Anup Kumar

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Month	Week 1	Week 2 <sup>nd</sup>	Week 3 <sup>rd</sup>	Week 4 <sup>th</sup>
March				
April	<p>S-Block Elements</p> <ul style="list-style-type: none"> <li>↳ comparative study</li> <li>↳ diagonal relationship</li> </ul>	<p>→ Salient features of Hydrides</p> <p>→ Solvation + complex formation tendencies</p>	<p>Chemistry of Nitric gas -</p> <ul style="list-style-type: none"> <li>↳ Chemical properties of Nitric gases with emphasis on their low chemical reactivity</li> </ul>	<p>→ Chemistry of Xenon</p> <p>→ Structure + bonding of fluorides, oxides + oxyfluoride etc.</p>
May	p-Block Elements	Boron family - Disproportionation	Boron family - Boranes	Carbon family
June	<p>Nitrogen family</p> <ul style="list-style-type: none"> <li>↳ Oxides, etc.</li> <li>↳ Relative strength</li> </ul>	<p>Nitrogen family</p> <ul style="list-style-type: none"> <li>↳ str. of white yellow + red phosphorus</li> </ul>	Oxygen family	Halogen family

Hydrogen Bonding + Vanderwaal forces

Metallic Bond and semiconductors

Month	Week-1	Week-2	Week-3	Week-4
March	<p>Kinetic - I</p> <ul style="list-style-type: none"> <li>→ Rate of <math>R_2O</math>, Rate Eq.</li> <li>→ factors affecting rate of <math>R_2O</math></li> </ul>			
April	<p>Kinetic - II</p> <ul style="list-style-type: none"> <li>Effect of Temp on Rate of <math>R_2O</math> - Arrhenius eq.</li> </ul>	<p>Theories of rate of <math>R_2O</math></p> <ul style="list-style-type: none"> <li>- simple collision theory for unimolecular</li> </ul>	<p>collision theory for bimolecular collision</p>	<p>Transition state theory of bimolecular Reaction</p> <ul style="list-style-type: none"> <li>→ order of <math>R_2O</math></li> <li>→ Integrate rate expression - 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> order</li> <li>- Zero, 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> order</li> <li>- Half life period of <math>R_2O</math>,</li> <li>- Method of determination of rate of <math>R_2O</math></li> </ul>
May	<p>Electrochemistry I - Electrolytic conduction factors affecting it.</p>	<p>Specific conductance, molar conductance, eq. relationship among them.</p>	<p>Arrhenius theory of ionization, Ostwald dilution law,</p>	<p>Debye Huckel-Onsager eq for strong electrolyte Transport No., Hi theory</p>
June	<p>Electrochemistry II Kohlrausch's law calculation of molar ionic conductance + effect of viscosity temp, + pressure on it</p>	<p>Application of Kohlrausch law in calculation of conductance of weak electrolyte or infinite dilution</p>	<p>Application of conductance measurements</p> <ul style="list-style-type: none"> <li>- determination of degree of dissociation</li> <li>- determination of <math>K_a</math> of acids, determination of solubility prod. of sparingly soluble salt</li> </ul>	<p>Conductometric Titration</p> <ul style="list-style-type: none"> <li>- definition of pH + pK<sub>a</sub></li> <li>- Buffer action</li> <li>- Henderson Hagedel Eq.</li> <li>- Buffer, <math>m_1, m_2</math> of buffer action</li> </ul>

Month	Week I	Week-2	Week-3	Week-4
March			Alkene - Nomenclature, $M^N$ of dehydration of alcohol + dehydration of alkyl halide	The Saytzeff rule for formation of alkene + relative strength of alkene
April	$M^N$ involved in hydrogenation Electrophilic + free radical addition Markovnikov's rule	Hydroboration-oxidation, oxymercuration reduction, ozonolysis, hydration, hydroxylation + oxidation with $KMnO_4$	Arenes and Aromaticity - Nomenclature - Aromatic number, $2n+6$ - Aromaticity rule - Annulenes up to 10 carbons	Aromaticity examples - Nitration, Halogenation, Sulfonation - Friedel Crafts $AlCl_3$ - Electrophilic displacement
May	Dienes and alkyne - Nomenclature & classification - Isolated, conjugated and cumulated diene - At. of benzene	Chemical $R^N$ - 1,2 & 1,1 addition - Diels Alder $R^N$	Nomenclature, At. + Bonding in alkyne, method of formation of alkyne, chemical $R^N$ of alkyne	- Oxidation of alkyne - $M^N$ of electrophilic addition $R^N$ - Hydroxylation - oxidation of alkyne
June	Alkyl and Aryl halide Nomenclature + classification of alkyl halide, method of formation - chemical $R^N$ - $M^N$ of attachment of nucleophilic substitution $R^N$ of alkyl halide	$S_N2$ + $S_N1$ $R^N$ with Energy profile diagram	Method of formation of alkyl halide - Addition - elimination $M^N$ of nucleophilic aromatic substitution	Relative reactivities of alkyl halide via alkyl, vinyl + aryl halides

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 Lecture Plan - 4th Sem (2021-22) Inorganic Chemistry

Dr. Anoop Kumar

MONTH	Week 1	Week 2	Week 3	Week 4
March	Actinides - general features and chemistry of actinides.	Chemistry of separation of Np, Pu and Am from U.	Comparison of Lanthanides with actinides & transition elements.	Complex formation - occurrence & isolation of lanthanide compound.
April	Chemistry of identification of acid radicals in typical combinations	Chemistry of interferences of acid Radicals including their removal	Chemistry of analysis of various basic Radicals.	Chemistry of analysis of various acid radicals
May	Theory of co-precipitation	Theory of Post-precipitation	Purification of precipitates	Theory of precipitation
June				Revision

Lesson Plan: 4th Sem, Session 2021-22, Organic Chemistry

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Month	Week - 1	Week - 2	Week - 3	Week - 4
March				
April	Application of UV & IR spectroscopy in str. elucidation of organic compound.	Amines - str. + nomenclature of amines, physical properties Separation of a mixture of 1 <sup>st</sup> , 2 <sup>nd</sup> + 3 <sup>rd</sup> amines	Infrared Absorption Spectroscopy - Molecular Vibs, Hooks law, selection Rule, Intensity + Absorption of IR bands, measurement of IR spectrum, finger print region	Characteristics absorption of various functional gp, Woodward rule, calibration of IR spectra, measurement of simple conjugated diene + $\alpha, \beta$ unsaturated ketones.
May	Diiazonium salt - M <sup>n</sup> of diazotisation, str. of benzene diazonium chloride Replacement of diazo gp H, OH, F, Cl, Br, I, NO <sub>2</sub> + CN gp	- Reduction of diazonium salt to hydroxylamine - coupling Rxn + its synthetic application	Preparation of nitro alkanes + nitro arenes and their chemical Rx <sup>n</sup>	M <sup>n</sup> of electrophilic substitution Rxn in nitro arenes + their reduction in acidic neutral, + alkaline medium
June	Aldehyde + ketone - Nomenclature + str. of carbonyl gp, synthesis of aldehyde + ketone.	Carbonyl reagent, PCC + pyridine dicarbonate. Synthesis using 1,3 dithione + ketone from nitriles + from carboxylic acids	Physical properties comparison of reduction of aldehyde + ketone Rxn of M <sup>n</sup> addn to carbonyl gp w/ comparison on benzoin condensation	alcohol, Pentin + Knoevenagel condensation Oxidation of alcohol Baeyer-Villiger oxidation MPV reduction