

Curriculum Plan of Dr. Kapil Mohan Saini
(Even Semester 2020-2021)
Semester-II

Name of Paper & Code: CHEMISTRY –GE-4, Chemistry of s- and p-Block Elements, States of Matter and Chemical Kinetics (4 Periods Per Week)

Contents	Allocations of Lectures	Month wise Schedule to be followed	Tutorials/ Assignment/ Presentation
<p>Kinetic Theory of Gases: Postulates of kinetic theory of gases and derivation of the kinetic gas equation, deviation of real gases from ideal behaviour, compressibility factor, causes of deviation, van der Waals equation of state for real gases. Boyle temperature (derivation not required), critical phenomena, critical constants and their calculation from van der Waals equation, Andrews isotherms of CO₂, Maxwell Boltzmann distribution laws of molecular velocities and molecular energies (graphic representation – derivation not required) and their importance. Temperature dependence of these distributions, most probable, average and root mean square velocities (no derivation), collision cross section, collision number, collision frequency, collision diameter and mean free path of molecules, viscosity of gases and effect of temperature and pressure on coefficient of viscosity (qualitative treatment only).</p>	10	4 th Week of April – 1 st week of May	<ul style="list-style-type: none"> - Syllabus Overview - Reference Books - Problem Solving
<p>Liquids: Surface tension and its determination using stalagmometer, Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer, effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only).</p>	3	2 nd Week of May	<ul style="list-style-type: none"> - Related Problems, Assignment
<p>s- and p- block elements Periodicity in s- and p-block elements with respect to electronic configuration, atomic and ionic size, ionization enthalpy, electronegativity (Pauling, Mulliken, and Allred-Rochow scales). Allotropy in C, S, and P. Oxidation states with reference to elements in unusual and rare oxidation states like carbides and nitrides), inert pair effect, diagonal relationship and anomalous behaviour of first member of each group. ,compounds of s- and p-block elements , diborane and concept of multicentre bonding. Structure, bonding and their important properties like oxidation/reduction, acidic/basic nature of the following compounds and their applications in industrial and environmental chemistry. Hydrides of nitrogen (NH₃, N₂H₄, N₃H, NH₂OH) Oxoacids of P, S and Cl, Halides and oxohalides: PCl₃, PCl₅, SOCl₂ and SO₂Cl₂.</p>	26	3 rd Week of May -3 rd Week of June	<ul style="list-style-type: none"> Home Register Overview, Class Test, Related Problems, Previous Year Qsn Papers discussion
<p>Solids: Forms of solids, symmetry elements, unit cells, crystal systems, Bravais lattice types and identification of lattice planes. Laws of crystallography - law of constancy of interfacial angles. Law of rational indices, Miller indices. X-ray diffraction by crystals, Bragg's law, structures of NaCl, KCl and CsCl (qualitative treatment only), defects in crystals. Glasses and liquid crystals</p>	6	3 rd Week of June to 4 th Week of June	<ul style="list-style-type: none"> Student' s Difficulties, Related Problems
<p>Chemical Kinetics: The concept of reaction rates, effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction, derivation of integrated rate equations for zero, first and second order reactions (both for equal and unequal concentrations of reactants), half-life of a reaction, general methods for determination of order of a reaction, Concept of activation energy and its calculation</p>	11	1 st Week of July to 2 nd Week of July	<ul style="list-style-type: none"> Home Register Overview, Student' s Difficulties,

from Arrhenius equation. Theories of reaction rates: Collision theory and activated complex theory of bi-molecular reactions. Comparison of the two theories (qualitative treatment only)			Related Problems
General Principles of Metallurgy Chief modes of occurrence of metals based on standard electrode potentials. Ellingham diagrams for reduction of metal oxides using carbon as reducing agent. hydrometallurgy with reference to cyanide process for silver and gold, Methods of purification of metals (Al, Pb, Ti, Fe, Cu, Ni, Zn): electrolytic, oxidative refining, Van Arkel-De Boer process, Mond's process and Zone Refining.	4	3 rd week of July	Class Test, Previous Year Qsn Papers discussion, Student' s Difficulties