KENDRIYA VIDYALAYA SANGATHAN, LUCKNOW REGION
Minimum Learning Package for CLASS XII (SESSION 2015-2016)

Day	CONTENT/CONCEPT/ATOMIC/MOL MASS
1	• Symbols, Formulae & its types, atomic/molecular mass, Formula making with the concepts of Ions • Types of chemical equations & Balancing tricks • Cocept of Atomicity with the coverage of superscripts & prefix in a molecular formula/ ionic formula
2.	• Concept of mole. • Relation of mole with mass volume , no. of particles & concentration of solution, units & interrelation of units of concentration. • Law of chemical equivalence. • Normality eqn. & Molarity eqn. • concepts of equivalent mass
3.	• Concept & use of logarithm, • Exponential terms & series with numerical • Plot of graph & interpretation
4.	• Plot of eqn. of Line & its mathmatical interpretation • Basic tricks of cross multiplications, Division & multiplication
5	• Application of '**Days 3'** topics in ref. to numericals . • Unit conversion • Exponential factors • Basic tricks of addition/subtraction/multiplication/cross multiplication
6.	• Concept of electronic configuration with emphasis on shells, subshells , orbitals & their types . • Quantum No relation to shells, subshells & orbitals • Position of elements in Periodic table • Tricks in remembering Modern Periodic Table (Visualisation)
7.	• Concept of atomic & Ionic size • Oxidation state & valency I.P., E.A, E.N & Inert Pair effect • Electrode Potential
8.	• Concept of base & acids(Lewis / Arrhenius/ Bronsted) • Application with Basicity & Acidity covering in organic structures.
9.	• Electronic configuration of C ground state and excited state configuration • Hybridistion and application, acidity of Alkynes • VSEPR theory and its applications
10.	• Electron Displacement and effects in organic Compounds viz, phenol, nitrophenol& Benzoic acid & alkenes. • Concept of 1^0, 2^0, 3^0 Alkyl halides, Alcohols,Amines • IUPAC Nomanclature

Day 1

Learning Objective

- To understand and apply the concept of Atomicity of elements.
- To comprehend the concept of chemical equivalence, covering Laws of chemical combination.
- To upgrade the concept of ions & radicals & their differences

Learning Experiences (Content/e-content)

- Symbol/Formula/Atomicity/Charge of chemical species

Element/species	Symbol/Formula	Atomicity	Charge	Formula Mass /Atomic mass /Molecular mass /Law
Ferous/Iron(II)	Fe^{2+}	----------	+2	
Feric /Iron (III)	Fe^{3+}	----------	+3	
Mercurous/Mercury(I)	Hg^{+}	----------	+1	At the
Mercuric (II)	Hg^{2+}	----------	+2	discretion of
Stanous/Tin(II)	Sn^{2+}	----------	+2	subject teacher
Stanic/Tin(IV)	Sn^{4+}	----------	+4	(Teacher
Ammonium	NH_4^{+}	----------	+1	empowered)
Phosphorous	P_4	4	------	
Sulphur	S_8	8	------	
Ozone	O_3	3	------	
Dioxygen	O_2	2	------	
Helium	He	1	------	
Carbonate	CO_3^{2-}	--------	-2	
Nitrate	NO_3^{-}	--------	-1	
Nitrade	N^{3-}	----------	-3	
Nitrite	NO_2^{-}	----------	-2	
Phosphate	PO_4^{3-}	----------	-3	
Phosphide	P^{3-}	----------	-3	
Phosphite	PO_3^{3-}	----------	-3	
Chlorate	ClO_3^{-}	----------	-1	
Per manganate	MnO_4^{-}	----------	-1	
Manganate	MnO_4^{2-}	----------	-2	

Formula Designing:-

Name of compound	Cationic Part	Anonic Part	Mol. Formula (tool criss cross method)
Aluminiumsulphate	Al^{3+}	SO_4^{2-}	$Al_2(SO_4)_3$
Feronssulphide	Fe^{2+}	S^{2-}	Fe_2S_2=FeS
Potasium chromate	K^+	Cro_4^{2-}	K_2CrO_4
Potassium Dichromate	K^+	$Cr_2O_7^{2-}$	$K_2Cr_2O_7$
Mercurous chloride	Hg^+	Cl^-	Hgcl(Hg_2Cl_2 Dimer)
Sodium manganate	Na^+	Mno_4^{2-}	Na_2Mno_4
Ammonium oxalate	NH_4^+	$C_2O_4^{2-}$	$(NH_4)_2C_2O_4$

- Molecular Formula/ Empirical formula:-
- Molecular Formula shows exact combining ratio Empirical formula shows simplest ratio.

eg.

Compound	MF	EF
Hydrogen Peroxide	H_2O_2	HO
Oxalic acid (Anhydrous)	$H_2C_2O_4$	HCO_2

- Balanced chemical equation.
- Mole concept in formula making
- Formula mass

DAY 2

Learning Objective:-

- To understand the concept of mole.
- To understand the concept of solution (Binary)
- To understand the concept of concentration of solution.
- To enhance the knowledge of units of concentration of solution

Learning Experiences (Content/ e-content)

- 1 mole in consonant with 1 pair or a dozen

Term	**Numeral Representation**
Pair	**02**
Dozen	**12**
1 Mole	**6.022×10^{23}**

- **Relationships w.r.t mole**
  - Mole Vs No. of Particles/entities :

    1 mole = 6.022×10^{23} identicalparticles or entities
  - Mole Vs Formula mass : mass of I mole atoms = Atomic Mass

    Mass of 1 mole molecules = Molecular Mass
  - Mole vs volume at STP – Vol. of 1 mole gas at STP = 22.4 L
  - Inter-relations between mole, volume, Numbers & mass of species.
- Solution (Binary):-

  Solution = solute + solvent (Component in bulk)
- Concentration of solution.

  Concentration of solution = Amount of solute/Amount of solvent/solution

- **Units of concentration :-**

No. of moles(m) = mass of species (w)/Formula mass(M)

Unit	Expressions	Mathematical expressions
Mass% (w/M)	$\frac{\text{Amount of solute(mass)}}{\text{Amount of solution (mass)}} \times 100$	w/Wx100
Mass%(w/V)	$\frac{\text{Amount of solute(mass)}}{\text{Volume of solution inml}} \times 100$	W/Vx100
Molality(m)	$\frac{\text{No. of moles of solute}}{\text{Mass of solvent in kg}}$	m = n/Win Kg
Molarity(M)	$\frac{\text{No. of moles of solute}}{\text{Volume of solution in Litre}}$	M= n/V in Litre
Normality(N)	$\frac{\text{No of miligram equivalent of solute}}{\text{Volume of solution in litre}}$	N = $\frac{\text{no of milligram equivalents of solute}}{\text{Volume of solution in Litre}}$

6. Equivalent Mass: E = Molar mass/n-factor

Species	**n-factor**
Acid	No of replaceable H^+ ions
Base	No of replaceable OH^- ions
Ion	No of charge
Oxidising agent/ Reducing	change in oxidation No.

- **Law of chemical Equilibrium:**

Let A+B _____ Product

Accoding to Law , "No of gram equivalents of A = No of gram equivalents of B"

Normality Eqn $(NV)_A = (NV)_B$

Or $N_1V_1 = N_2V_2$

Molarity Equations $n_1M_1V_1 = n_2M_2V_2$

Learning outcomes:-

The student is ready to use the following mathematical skills in chemistry numericals

- Normality equation.
- Molarity equations
- Concentration units & interrelationships.
- Density & concentration of solution.

DAY 3

Learning Objectives:-

- To equip the students with mathematical skills .
- To equip the students with interdisciplinary skills.
- To enhance the perceptibility index of the learner.

Learning Experiences (Content/e-content)

Working rules of Logarithm:-

- First Law :- $\log_a(mn) = \log_a m + \log_a n$

(where a>0& a ≠ 1)

- Second Law:- $\log_a(m/n) = \log_a m - \log_a n$
- Third Law :- $\log_a(m)^n = n\log_a m$
- **Expansion of exponential series.**

  $e^x = 1+x/1! + x^2/2! + x^3/3! + \ldots\ldots\ldots\ldots\ldots\ldots$inf. xbeongs R

- **Expansion of log series:-**

  $\text{Log}(1+x) = x-x^2/2 + x^3/3 - x^4/4+\ldots\ldots\ldots\ldots$. IXI <1

- **If $\log_a X = y$ then $a^y = x$**

Learning outcome:-

The student is enabled to understand

- Application of logarithm.
- Use of log table & log based calculation.
- Use of exponential series & long series & its use in solving numericals

DAY 4

Learning Objectives

- To understand the application of equation of line in numericals of chemistry.
- To relate shapes of curves/ graphs with mathematical equation.

Learning experiences (Content/e-content)

- Graph (refer various types of graphs and their interpretations)

Mathematical Expressions:-

- Equation of straight Line with +ve slope fig(iii) Y = mx+C
- Equation of straight Line with –ve slope fig (ii) Y = (-m)x+C
- Equation of straight Line with passing through origin (IV) y = mx

Exponential equation $Y = e^{x}$

$$Y = e^{-x}$$

- **Interpretation of equation of straight Line (explnation through eqn of straight line))**

Y = mx+C

Y = (-m)x+C

Learning Outcome:- The students are enabled to

- Know the meaning of slope and intercept on y axis
- Facilitate in understanding of Arrhenius equation Adsorption isotherm &kinematics of zero & first order reactions.

DAY 5

Learning Objective:-

- To understand the use of log table in solving numerical .
- To upgrade/ enhance mathematical skills of the learner

Learning Experiences (Content/e-content):-

1.$\log_{10}10 = 1$

2.$\log_{10}10^{-3} = .001$

3. $\log_{10}10^{0} = 1$

Number	Log	Characteristic	Mantissa
200	2.3010	2	0.3010
$2.6x10^{3}$	3.4150	3	0.4150
$2x10^{-4}$	$\overline{4}.3010$	-4	0.3010

Learning outcome:-

The student is enabled to

- Use log table
- Evaluate log based numerical.

3. Quantum Numbers:-

- If n=4 , l=1 , m_l=0 Predict orbital
  - 4py l = 1

  If n =4 , l=2 , m_l=0

  $4d_{zx}$

  Predict Q.No. values for last added e incr

  - Cr(24) = [Ar] $3d^5$ $4s^1$ n=3, l=2, ml = +2

  Q. Predict Q.No values for outermost e- of Cr

  Outermost e- is in $4s^1$ n=4, l=0, ml=0

  Learning outcome:-The students are enabled

- To learn the different shapes in relation to quantum numbers.
- To know the exceptions in electronic configuration of elements.
- To evaluate all quantum no. values of ane- in atom

Day 6

Learning Objectives:-

- To understand the shapes of atomic orbitals.
- To understand classification of elements.

Learning experience (content/ e-content)

- Electronic configuration w.r.t Aufbau's Principle/ Pauliexclusion Principle.

  1s<2s<2p<3s<3p<4s<3d ……..

  Capacity of s =2, p=6, d=10, f=14

  Examples

  Cr(24) $1s^2$, $2s^2$, $2p^6$, $3s^2$, $3p^6$, $4s^1$, $3d^5$

  ($1s^2$, $2s^2$, $2p^6$, $3s^2$, $3p^6$, $3d^5$, $4s^1$)

  OR

  [Ar] $3d^5 4s^1$

  Cr^+ [Ar] $3d^5$

  Cu [Ar] $3d^{10}$, $4s^1$

  Cu^+ [Ar] $3d^{10}$

  Cu^{++}[Ar] $3d^9$

- Tricks of Learning modern periodic Table

DAY 7

Learning Objectives:-

- To understand periodicity in Properties of elements.
- To understand Atomic properties of elements.
- To understand trends in variation of Properties in modern periodic table.
- To understand the difference between valency& oxidation number

Learning experiences (content/e-content):-

- Explanation of Atomic properties of elements viz .Electron gain enthalphy, Ionisation enthalpy, elctron Affinity, Atomic size, Ionic size & Inert Pair effect.
- Definition & units of Atomic properties.
- Explanation of electrode Potential & its relation with Ionization enthalpy.

Learning outcome:-The students are enabled

- To know the trends in properties (Atomic) of elements.
- To differentiate between variation in atomic properties and physical properties.
- To know the molecular structure & its relation with atomic properties.

Days 8

Learning objects:-

- To understand the dependence of properties on molecular structure of compounds.
- To correlate various properites with structural dimensions of the compounds.
- To understand the interdependence of Physical and chemical properties of compounds.

Learning experiences(Contents/e-content):-

THEORY	**ACID** **1**	**BASE** **2**	**CONJUGATE ACID OF 2** **3**	**CONJUGATE BASE OF 2** **4**
Arrhenius Bronsted Lewis	Gives H^+ ion HCl Proton(H^+)doner H_2O,HCl,H_2SO_4 Electron pair acceptor BF_3Alcl_3	Gives OH^-NaoH Proton accepting NH_3, OH^-, $HCO3^-$ Electron pair doner NH_3, H_2O	- NH_4^+, H_2O,H_2CO_3 -----	- NH_2^-, O^{--}, $CO_3^{—}$ ----------

Resonance Aromatic compounds

Similar structures can be discussed

Leaning outcome:- The students are enable to

- Understand the use of basic concepts of chemistry.
- Know the linkage between structure & properties of the compounds.

Day 9

Learning Objectvies:-

- To understand organic chemistry from its genesis.
- To understand various theories of bonding in chemical substances.

Learning expences(content/e-content)

- Ground state config of C $1s^2\ 2s^2 2p^2$

  Excited state config of C $1s^2 2s^1 2p_x^1, 2p_y^1, 2p_z^1$
- Structural & Textual details of Hybridization& its types.
- Explanation of acidic nature of alkynes.
- Introductory details of VSEPR theory & its applications.

Learning outcome:-The students are enabled

- To the basics of organic compounds.
- To learn the shapes & structures of compounds.
- To relate acidic character with structures**.**

Days 10

Learning objectives:-

- To understand Basic concepts of chemistryw.r. t. organic compounds.
- To understand the difference between 1^0,2^0,3^0,4^0c

Learning Experiences (content/ e-content)

- Explanation of + I effect – I effect , + E effect, -E effect, +R effect, -R effect & Baker Nathan effect (Hyper conjugation)
- Explanation of Primary, Secondary Tertiary Alcohol, amines and Alkyl halides.

Learning Outcomes:- The students are enabled to

- Learn acidity basicity in relation to molecular structure.
- Distinguish between 1^0,2^0& 3^0 organic compounds.
