Assam Higher Secondary Education Council

Revised Syllabus Chemistry (Theory) for H.S.2nd Year (Session 2022-23)

Distribution of Marks

SL NO.	UNIT	No. of periods	Marks
1	The Solid State	10	4
2	Solutions	12	5
3	Electrochemistry	12	5
4	Chemical Kinetics	12	5
5	Surface Chemistry	9	3
6	p-Block Elements	18	6
7	d- and f-Block Elements	8	4
8	Coordination Compounds	10	5
9	Haloalkanes and Haloarenes	20	8
10	Alcohols, Phenols and Ethers	15	6
11	Aldehydes, Ketones and Carboxylic Acids	20	8
12	Amines	12	5
13	Biomolecules	7	3
14	Polymers	5	3
	Total	**170**	**70**

Syllabus (Theory) for Session 2022-23

The Solid State

1.1 General Characteristics of Solid State

1.2 Amorphous and Crystalline Solids

1.3 Classification of Crystalline Solids

1.4 Crystal lattices and Unit Cell

1.5 Number of Atoms in a Unit Cell

1.6 Close Packed Structure

1.7 Packing Efficiency

1.8 Calculation Involving Unit Cell Dimensions

1.9 Imperfection of Solids

1.10 Electrical Properties

Solutions

2.1 Types of Solutions

2.2 Expressing Concentration of Solutions

2.3 Solubility

2.4 Vapour Pressure of Liquid Solutions

2.5 Ideal and Non-ideal solutions

2.6 Colligative Properties and Determination of Molar Mass

Electrochemistry

3.1 Electrochemical Cell

3.2 Galvanic Cell

3.3 Nernst Equation

3.4 Conductance of Electrolytic Solution

3.5 Electrolytic Cell and Electrolysis (**Deleted 3.5.1 Product of Electrolysis**)

Chemical Kinetics

4.1 Rate of a Chemical Reaction

4.2 Factors Influencing Rate of a Reaction

4.3 Integrated Rate Equations (zero order, first order, half-life of a reaction)

4.4 Pseudo First Order Reaction

4.5 Temperature Dependence of the Rate of a Reaction

Surface Chemistry

5.1 Adsorption

5.2 Catalysis (**Deleted 5.2.2 Adsorption Theory of Heterogeneous Catalysis, 5.2.3 Shape Selective Catalysis by Zeolites**)

5.3 Colloids

5.4 Classification of Colloids (**Deleted 5.4.4 Preparation of Colloids**)

5.5 Emulsions

5.6 Colloids Around Us

The p-Block Elements

7.1 Group 15 Elements

7.2 Dinitrogen

7.3 Ammonia

7.5 Nitric Acid

7.6 Phosphorous – Allotropic Forms

7.7 Phosphine

7.9 Oxoacids of Phosphorous (Hypophosphorous Acid, Orthophophorous acid and Orthophosphoric acid only)

7.10 Group 16 Elements

7.11 Dioxygen

7.12 Simple Oxides

7.13 Ozone

7.14 Sulphur – Allotropic Forms

7.15 Sulphur Dioxide

7.16 Oxoacids of Sulphur

7.17 Sulphuric Acids

7.18 Group 17 Elements

7.19 Chlorine

7.20 Hydrogen Chloride

7.21 Oxoacids of Halogens

7.22 Interhalogen Compounds

7.23 Group 18 Elements

d- and f- Block Elements

8.1 Positions in the Periodic Table

8.2 Electronic Configuration of the d-Block Elements

8.3 General Properties of the Transition Elements

(**Deleted 8.3.5 Trends in the M^{2+}/M Standard Electrode Potential, 8.3.6 Trends in the M^{3+}/M Standard Electrode Potential, 8.3.8 Chemical Reactivity and E^0 values**)

8.5 The Lanthanides (**Deleted 8.5.4 General Characteristics**)

Coordination Compounds

9.1 Werner's Theory of Coordination Compounds

9.2 Definitions of Some Important Terms Pertaining to Coordination Compounds

9.3 Nomenclature of Coordination Compounds

9.5 Bonding in Coordination Compounds (**Deleted 9.5.3 Limitations of Valence Bond Theory, 9.5.4 Crystal Field Theory, 9.5.6 Limitation of Crystal Theory**)

9.8 Importance and Application of Coordination Compounds

Haloalkanes and Haloarenes

10.1 Classifications

10.2 Nomenclature

10.3 Nature of C-X bonds

10.4 Methods of Preparation of Haloalkanes

10.5 Preparation of Haloarenes

10.6 Physical Properties

10.7 Chemical Reactions

(**Deleted Polyhalogen Compounds**)

Alcohols, Phenols and Ether

11.1 Classifications (Alcohols, Phenols and Ethers)

11.2 Nomenclature (Alcohols, Phenols and Ethers)

11.4 Alcohols and Phenols (Preparations, Physical Properties, Chemical Reactions

11.6 Ethers (Preparation, Physical Properties and Chemical Reaction)

Aldehydes, Ketones and Carboxylic Acids

12.1 Nomenclature and Structure of Carbonyl Groups

12.2 Preparation of Aldehydes and Ketones

12.3 Physical Properties (Aldehydes and Ketones)

12.4 Chemical Reactions (Aldehydes and Ketones)

12.6 Nomenclature and Structure of Carboxyl Group

12.7 Methods of Preparation of Carboxylic Acids

12.8 Physical Properties (Carboxylic Acids)

12.9 Chemical Reactions (Carboxylic Acids)

Amines

13.1 Structure of Amines

13.2 Classification

13.3 Nomenclature

13.4 Preparation of Amines

13.5 Physical Properties

13.6 Chemical Reactions

13.7 Methods of Preparation of Diazonium Salts

13.8 Physical Properties

13.9 Chemical Reactions

Biomolecules

14.1 Carbohydrates (14.1.1 Classification, 14.1.2 Monosaccharaides, 14.1.2.1 Glucose, **Deleted Structure of Glucose,** Cyclic Structure of Glucose, 14.1.2.2 Fructose, Structure of Fructose, **Deleted 14.1.3 Disaccharides, Deleted 14.1.4 Polysaccharides, Deleted 14.1.5 Importance of Carbohydrate**)

14.2 Proteins (Elementary ideas of proteins and amino acids, Peptide bonds, Polypeptides, Structure of proteins (Primary, secondary, Tertiary and Quaternary structure (Qualitative ideas only), Denaturation of proteins)

14.4 Vitamins (Types of Vitamins and deficiency diseases)

14.5 Nucleic Acids (DNA & RNA)

Polymers

15.1 Classification of Polymers

15.2.1.2 Some Important Addition Polymers

15.2.2.1 Some Important Condensation Polymers

Syllabus Chemistry (Practical) for H.S.2nd Year (Session 2022-23)

3 HOURS DURATION/30 MARKS

Evaluation Scheme for Practical Examination	Marks
Volumetric Analysis	6
Qualitative Analysis (Salt Analysis)	10
Any one experiment from F,G,H	4
Project Work OR Any three experiments from A to E	5
Class Record and Viva	5
Total	30

SYLLABUS FOR CHEMISTRY PRACTICAL
Total Marks- 30 Total Periods 60

A. Surface Chemistry

(a) Preparation of one lyophilic and one lyophobic sol.

Lyophilic sol : starch, egg albumin and gum.

Lyophobic sol : aluminium hydroxide, ferric hydroxide, arsenious sulphide.

(b) Dialysis of sol prepared in (a) above.

(c) Study of the role of emulsifying agent in stabilizing the emulsions of different oils.

B. Chemical Kinetics

(a) Effect of concentration and temperature on the rate of reaction between sodium thiosulphate and hydrochloric acid.

(b) Study of reaction rates of any one of the following:

(i) Reaction of iodide ion with hydrogen peroxide at room temperaturc using different concentration of iodide ions.

(ii) Reaction between potassium iodate (KIO_3) and sodium sulphite (Na_2SO_3) using starch solution as indicator (clock reaction).

C. Thermochemistry

Any one of the following experiments:

(a) Enthalpy of dissolution of copper sulphate or potassium nitrate.

(b) Enthalpy of neutralization of strong acid (HCl) and strong base (NaOH).

(c) Determination of enthalpy change during interaction (Hydrogen bond formation) between acetone
and chloroform.

D. Electrochemistry

Variation of cell potential in Zn/Zn2+//Cu2+/Cu with change in concentration of electrolytes (CuSO4 or ZnSO4) at room temperature.

E. Chromatography

(a) Separation of pigments from extracts of leaves and flowers by paper chromatography and determination of R*f* values.

(b) Separation of constituents present in an inorganic mixture containing two cations only (constituents having wide difference in R*f* values to be provided)

F. Preparation of Inorganic Compounds

(a) Preparation of double salt, ferrous ammonium sulphate or potash alum.

(b) Preparation of potassium ferric oxalate.

G. Preparation of Organic Compounds

Preparation of any one of the following compounds:

(a) Acetanilide

(b) Di-benzal acetone

(c) *p*-Nitroacetanilide.

(d) Aniline yellow or 2-Napththol aniline dye.

H. Test for the Functional Groups Present in Organic Compounds

Unsaturation, alcoholic, phenolic, aldehydic, ketonic, carboxylic and amino (primary) groups.

I. Study of Carbohydrates, Fats and Proteins in pure form and detection of their presence in given Food Stuffs

J. Volumetric Analysis:

Determination of Concentration/Molarity of KMnO4 Solution by Titrating it against a Standard Solution of

(a) Oxalic acid

(b) Ferrous ammonium sulphate

(Students will be required to prepare standard solutions by weighing themselves).

K. Qualitative Analysis

Determination of one anion and one cation in a given salt.

Cations. Pb^{2+}, Cu^{2+}, Al^{3+}, Fe^{3+}, Mn^{2+}, Ni^{2+}, Zn^{2+}, Co^{2+}, Ca^{2+}, Sr^{2+}, Ba^{2+}, Mg^{2+}, NH_4^+

Anions. CO_3^{2-}, S^{2-}, SO_3^{2-}, SO_4^{2-}, NO_2^-, NO_3^-, Cl^-, Br^-, I^-, PO_4^{3-}, $C_2O_4^{2-}$.CH_3COO^-

(Note : Insoluble salts excluded)

L. Projects

Scientific investigation involving laboratory testing and collecting information from other sources.

Study of presence of oxalate ions in guava fruit at different stages of ripening.

Study of quantity of casein present in different samples of milk.

Preparation of soybean milk and its comparison with the natural milk with respect to curd formation, effect of temperature, ete.

Study of the effect of potassium bisulphate as food preservative under various conditions (temperature, concentration, time etc.)

Study of digestion of starch by salivary amylase and effect of pH and temperature on it.

Comparative study of the rate of fermentation of following materials: wheat flour, gram flour, potato juice, carrot juice, etc.

Extraction of essential oils present in *Saunf* (aniseed), *Ajwain* (carum), *Illaicbi* (cardamom).

Study of common food adulterants in fat, oil, butter, sugar, turmeric powder, chilli powder and pepper.

Note : Any other investigatory project, which involves about 10 periods of work, can be chosen with the approval of the teacher.

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