

1.0 GENERAL CHEMISTRY

1.1 Concept of symbol, valency, formula, atomic mass, molecular mass, elementary idea of atomic structure (Review). Periodic table.

1.2 Solution

1.2.1 Classify and explain solution according to concentration.

1.2.2 Distinguish among suspension, colloids and true solution.

1.2.2 Define and explain solubility, effect of temperature on solubility.

1.2.3 Mention practical applications of colloids in different situations.

1.2.4.1 Colloidal impurities in drinking and sewage water.

1.2.4.2 Finely divided colloidal particles in air causes Air-Pollution.

1.3 Acid, Base and Salt

1.3.1 Define and classify acid, base and salt (Review)

1.3.2 Define and explain normal solution, molar solution, titration and indicator

1.3.3 Define pH of a solution and pH Scale

1.3.4 Calculate pH from H^+ ion concentration

1.3.5 Mention application of pH in industry such as

1.3.5.1 pH of a boiler feed water

1.3.5.2 Role of pH in sewage treatment

1.3.5.3 pH in Sugar, Paper industry

1.3.5.4 Buffer Solution, types and application.

1.4 Chemical Bonding

1.4.1 Chemical Bonding, Types of Bond, Covalent Bond, Ionic Bond, Hydrogen Bond and Metallic Bond

2.0 CHEMISTRY OF WATER

2.1 Different types of impurities present in natural water and name impurities under each of them types.

2.2 Explain how natural water gets contaminated with the impurities.

2.3 Explain the action of soap on water

2.4 Define and explain soft and hard water with illustrations

2.5 Classify and explain hardness of water with illustration

2.6 State different ways of expressing concentration of impurities in water including hardness.

2.7 Name the bad effects caused by natural water when used in domestic as well as industrial purpose.

2.8 State and explain the remedial measures of the following bad effects of natural water in boiler.

- Scales and sledges
- Caustic Embrittlement
- Priming and foaming
- Corrosion

2.9 Define boiler feed water

2.10 Describe with help of diagram of the following water treatment Process.

2.10.1 Lime soda process

2.10.2 Permut or Zeolite process

2.11 Describe with the help of block diagram, the treatments done on a sample of raw water to produce drinking water and boiler feed water.

Solve problems on a) bad effects on natural water b) Water treatment process.

3.0 PHYSICAL CHEMISTRY

3.1 Catalyst, types, characteristics and application of Catalyst in Industries

3.2 Radioactivity-Introduction, Characteristics of alphas, beta and gamma rays, half-life period, artificial fission, atomic fusion, application in different fields.

4.0 ORGANIC CHEMISTRY

- 4.1 Organic chemistry and its scope in various industries.
- 4.2 Tetravalency of Carbon atom
- 4.3 Functional groups
- 4.4 Distinguish between organic and inorganic compounds.
- 4.5 Homologous series-alkane, alkene, alkyne, alcohol, aldehyde, ketone, ether, carboxylic acid.(general formula)
- 4.6 Preparation method of Methane, ethane Ethene and ethylene
- 4.7 Benzene and its preparation and discuss its derivatives

5.0 Refractories

- 5.1 Define refractories
- 5.2 Classification
- 5.3 Properties
 - 5.3.1 Refractoriness,
 - 5.3.2 Strength
 - 5.3.3 Thermal expansion,
 - 5.3.4 Porosity
- 5.4 Portland Cement
 - 5.4.1 Composition
 - 5.4.2 Properties
 - 5.4.3 Types.

Chemistry-II

1.0 ELECTROCHEMISTRY

- 1.1 Definition conductor, insulator, semi-conductor, electrolyte and Non-electrolyte with examples.
- 1.2 Arrhenius's postulates of electrolysis and electrolytic theory of dissociation.
- 1.3 Faraday's 1st and 2nd laws of electrolysis and uses in practical field.
- 1.4 Definition conductance, specific conductance, and molar conductance, electrochemical equivalence and electrochemical cell
- 1.5 Solve problems on electrolysis

2.0 FUEL

- 2.1 Definition 'fuel' and 'combustion of fuel' with examples.
- 2.2 Explain importance of fuels in industries.
- 2.3 State the classification of fuels into two different ways, namely
 - 2.3.1 Classification based upon occurrence with examples.
 - 2.3.2 Classification based upon state of aggregation with examples.
- 2.4 Define calorific value and mention its units.
- 2.5 Distinguish between gross (or higher) and net (or lower) calorific value.
- 2.6 State the relative merits and demerits of solid, liquid and gaseous fuel
- 2.7 State the availability of different fuels in India.
- 2.8 Define coal.
- 2.9 State and explain origin of coal.
- 2.10 Classify coal by rank.
- 2.11 Define pulverized coal
- 2.12 State the advantage and disadvantage of pulverized coal.
- 2.13 Explain proximate and ultimate analysis of coal.
- 2.14 Define 'Petroleum' or 'Crude oil'
- 2.15 Describe the fractional distillation of crude petroleum
- 2.16 Name the main products obtained from crude petroleum and mention their respective boiling ranges and uses.
- 2.17 State and explain important properties of liquid fuels namely, viscosity, flash and fire point, smoke point, aniline point, knocking, octane number, cetane number, anti-knocking properties.
- 2.18 State composition, preparation and industrial application of coal gas, water gas, producer gas, LPG,

natural gas and gobar gas.

3.0 LUBRICANTS

- 3.1 Definition 'lubricant' and 'lubrication'.
- 3.2 Major functions of a lubricant.
- 3.3 Different types of lubricants with examples
- 3.4 Applications.

4.0 CORROSION

- 4.1 Definition corrosion.
- 4.2 Causes of corrosion.
- 4.3 Types of corrosion of metal.
- 4.4 Explain chemical corrosion of metals and mention the names of the corrosion products.
- 4.5 Explain rusting of iron
- 4.6 Name the various methods of corrosion control.

5.0 PROTECTIVE COATING

- 5.1 State the necessity of protective coating.
- 5.2 State the main types of protective coatings.
- 5.3 Recall the different kinds of organic and inorganic (or metallic) protective coating.
- 5.4 Explain the term "Paint"
- 5.5 State the functions of component-drying oil, pigment, driers and thinners with examples.
- 5.6 Varnish, types and application.

6.0 POLYMER AND PLASTICS

- 6.1 Definition polymer.
- 6.2 The types of polymerization.
- 6.3 Classify polymers
- 6.4 Properties of thermoplastics and thermosetting polymers.
- 6.5 Define plastics
- 6.6 Name important plastic materials with their properties and uses (in tabular form).
Namely: Polythene, Polypropylene, polystyrene, PVC, Nylon, Terelene, Neoprene, Bakelite, Urea-formaldehyde and PET.
- 6.7 Mention examples of plastics used in different situations:
 - i) Electrical insulation
 - ii) Lubrication
 - iii) Ropes and beams
 - iv) Optical lens
 - v) Adhesives
 - vi) Pipes and housing
 - vii) Fiber glass
 - viii) Carry bag

7.0 METALLURGY AND ALLOYS

- 7.1 Types of metals & properties
- 7.2 General Metallurgical process
- 7.3 Metallurgy of iron by blast furnace (principle only)
- 7.4 Classification of Steel based on its carbon content and its application
- 7.5 Properties of cast iron, wrought iron and steel
- 7.6 Effects of adding alloying elements on the properties of steel
- 7.7 Definition of alloy and purpose of alloying
- 7.8 Method of preparation of alloy (brief outline only)
- 7.9 Composition, properties and engineering uses of following alloys:
Duralumin, Magnalium, Brass, Bronze, Monel metal, Babbitts metal, Gun metal and Alnico.

SYLLABUS FOR LECTURER (CHEMISTRY) EXAMINATION 2019

FULL MARKS=85

List of Equipment to be used for practical:

1. Pensky- Martein instrument
2. Red-wood Viscometer
3. Smoke meter
4. Bomb Calorimeter
5. Conductivity-TDS meter
6. Aniline point meter
7. Muffle Furnace
8. Hot air oven
9. Electronics balance
10. Different sieve trays
11. Glassware, Porcelain ware, and reagent