

Secondary School Certificate Examination Syllabus

CHEMISTRY

Class IX examination in 2010 and onwards

Part I (Class IX)

1. Fundamentals of Chemistry:

1.1 Chemistry and branches of chemistry

1.1.1 Define chemistry and its various branches

1.2 Basic Definitions:

1.2.1 Define atom, atomic number, atomic mass and atomic mass unit

1.2.2 Define relative atomic mass based on C-12 scales

1.2.3 Differentiate among elements, compounds and mixtures

1.2.4 Distinguish between atoms and ions

1.2.5 Differentiate between molecules and molecular ions

1.2.6 Distinguish between ion and free radical

1.2.7 Classify the chemical species into element, mixture, compound, ions molecular ions and free radical

1.3 Empirical and molecular formulas:

1.3.1 Define empirical and molecular formula

1.3.2 Calculate the empirical formula

1.3.3 Calculate the molecular formula from the molecular mass and empirical formula;

1.4 Avogadro's Number and Mole:

1.4.1 Define the terms: gram atomic mass gram molecular mass, formula mass, formula unit, mole and Avogadro's number

1.4.2 Relate gram atomic mass, gram molecular mass and gram formula mass to mole And Avogadro's number

1.5 Chemical equations / calculations:

1.5.1 Describe the characteristics of chemical equations

1.5.2 Name and explain the types of chemical reactions with examples

1.5.3 Balance the chemical equations by inspection and trial and error methods

1.5.4 Calculate the mole ratio and recalled calculations based on balanced chemical Equation by combustion analysis

**For complete preparation & notes of Aga khan board according to SLO's
(Theory & Practical)**

Call: 3668-1927 The Education Center

2. Atomic structure:

2.1 Location of proton, neutron and electron:

2.1.1 Describe the structure of an atom including the location of the proton, electron and neutron

2.1.2 Calculate the number of e^- , p^+ and n of the given atom and ions

2.1.3 Draw the atomic structure of the first eighteen elements and their ions

2.2 Theories and experiments related to atomic structure:

2.2.1 Describe Rutherford experiment and the discovery of atomic nucleus

2.2.2 Discuss the defects of Rutherford's atomic model

2.2.3 Describe Bohr's atomic model

2.3 Isotopes:

2.3.1 Define isotopes

2.3.2 Draw the structure of different isotopes of H, C, O, Cl and U from their mass number and atomic number

2.3.3 Discuss the importance of isotopes in various fields of life

2.4 Shells and sub-shells:

2.4.1 Distinguish between shells and sub shells

2.5 Electronic configuration:

2.5.1 Write the electronic arrangement (K, L, and M) and electronic configuration (s, p, d) of the first eighteen elements in the periodic table.

**For Demo tests, Test papers, Multiple choice question preparation
Aga khan board / Board of Secondary & Intermediate Education Karachi**

Visit: www.tec.edu.pk

Periodic Table and periodicity:

3.1 Periodic Table:

3.1.1 State the modern periodic law

3.1.2 Distinguish between a period and a group in the periodic table;

3.1.3 Identify the groups and periods of elements on the basis of electronic configuration

3.1.4 Explain the shape of the periodic table (s, p, d, f blocks) and table into s-block and p-block

3.1.5 Determine the location of families on the periodic table

3.1.6 Discuss the characteristics of different groups (I- VIII)

3.2 Periodic Properties:

3.2.1 Recognize the similarity in the chemical and physical properties of elements in the same family of elements

3.2.2 Describe the periodic trend by using shielding effect, electro negativity, atomic radii, electron affinity and ionization energy within a group and a period of the periodic table

**For complete preparation & notes of Aga khan board according to SLO's
(Theory & Practical)**

Call: 3668-1927 The Education Center

4. Structure of Molecules:

4.1.1 Find the number of valence electrons in an atom using the periodic table

4.1.2 State the importance of noble gas electronic configuration in the formation of ion

4.1.3 State the octet and duplet rules

4.1.4 Describe the ways in which duplet bonds may be formed

4.1.5 Describe the formation of cat ions from an atom of a metallic element

4.1 **Formation of chemical bond:**

4.1.6 Describe the formation of anions from an atom of a non-metallic element

4.2 **Ionic Bond:**

4.2.1 Draw the dot and cross structure of ionic compound for example (NaCl, Mg O, K O and Ca Cl)

4.2.2 Describe the characteristics of an ionic bond

4.2.3 Recognize a compound as having ionic bond

4.2.4 Identify the characteristic of ionic compounds

4.3 **Covalent bond:**

4.3.1 Describe the formation of a covalent bond between two non-metallic elements

4.3.2 Describe with example single, double and triple covalent bond

4.3.3 Draw electron cross and dot structures for simple covalent molecules containing single, double and triple bond

4.4 **Co-ordinate covalent bond:**

4.4.1 Describe the formation of coordinate covalent bond by donation of an electron pair from one element to the other element (e.g. ammonium chloride)

4.4.2 Explain (a) the difference in the formation of coordinate covalent compounds and covalent compounds (b) lack of difference in chemical properties of coordinate covalent compounds and covalent compounds

4.4.3 Describe that

(a) Valence electrons of metals are loosely held by the nucleus of the atoms

(b) Metallic ions are embedded in their electronic clouds

(c) For establishment of the electronic cloud, the nucleus of the positively charged metallic ions lead to formation of a metallic bond

4.5 **Metallic bond:**

4.5.1 Describe the properties of metallic bonds of different metals;

4.5.2 Draw electronic dot diagrams of different types of chemical bonds

4.6 **Intermolecular forces:**

4.6.1 Identify weak forces of interactions such as a hydrophobic and hydrogen bonding

**For Demo tests, Test papers, Multiple choice question preparation
Aga khan board / Board of Secondary & Intermediate Education Karachi**

Visit: www.tec.edu.pk

States of Matter:

5.1 **Physical states of matter**

5.1.1 Describe the physical state of matter with regard to intermolecular forces present between them

5.2 Gaseous state:

Typical properties:

5.2.1 Explain the properties of gases (diffusion, effusion and pressure)

5.3 Laws related to gases:

5.3.1 Account for pressure and volume changes in a gas using Boyle's law

5.3.2 Account for temperature and volume changes in a gas using Charles's law

5.4 Liquid state:

Typical properties:

5.4.1 Summarize the properties of liquid like evaporation, vapor pressure boiling point

5.4.2 Explain the effect of temperature and external pressure on vapor pressure and boiling point

5.5 Solid state:

Typical properties:

5.5.1 Describe physical properties of solids (melting and boiling points)

5.5.2 Differentiate between amorphous and crystalline solids

Types of solid:

5.6.1 Define allotropes and explain allotropic forms of solid (Example carbon)

**For complete preparation & notes of Aga Khan board according to SLO's
(Theory & Practical)**

Call: 3668-1927 The Education Center

6. Solutions:

6.1 Solution, aqueous solution, solute, and solvent:

6.1.1 Define the terms: solution, aqueous solution, solute and solvent and give an example of each

6.2 Saturated, unsaturated, supersaturated solutions and dilution of solution

6.2.1 Explain the formation of solution (gases into gases, gases into liquid, gases into solid, liquid into gases, liquid into liquid, liquid into solid, solid into liquid, solid into solid, solid into gases)

6.3 Types of solution:

6.3.1 Explain the difference between saturated unsaturated and supersaturated solution

6.3.2 Prepare (0.1 M or 0.5 M) oxalic acid in 250 ml or a liter flask

6.3.3 Carry out dilution of solutions of different concentration

6.4 Concentration Units:

6.4.1 Give the meaning of concentration of solution

6.4.2 Define molarity and solve problems involving the molarity of a solution

6.4.3 Define percentage solution

6.4.4 Describe how to prepare dilute solution from concentration solutions of known molarity

6.4.5 Use the rule that like dissolves like to predict the solubility of one substance to Another

6.5 Factors affecting solubility:

6.5.1 Define solubility

6.5.2 Identify the factors which affect the solubility like temperature and pressure

6.5.3 Determine the effect of temperature on solubility of a solution

6.6 Crystallization:

6.6.1 Define crystallization

6.6.2 Purify an impure substance through crystallization

6.6.3 Crystallize the copper sulphate

6.6.4 Prepare potash alum

6.7 Comparison of Solutions, Suspension, and Colloids:

6.7.1 Differentiate between solutions, suspension

Electrochemistry:

7.1 Oxidation and reduction, Oxidation-Reduction Reactions:

7.1.1 Define oxidation and reduction in terms of loss or gain of oxygen or hydrogen or electrons

7.2 Oxidation States:

7.2.1 Define oxidation state

7.3 Oxidation States and Rules for Assigning:

7.3.1 State the common rules used for assigning oxidation numbers to free elements, ions (simple and complex), molecules, atoms

7.3.2 Determine the oxidation number of an atom of any element in a compound

7.4 Oxidizing and Reducing Agents:

7.4.1 Define oxidizing and reducing agents in a redox reaction

7.4.2 Identify the oxidizing and reducing agents in a redox reaction

7.5 Electrochemical Cells:

7.5.1 Sketch an electrolytic cell; label the cathode and the anode

7.5.2 Identify the direction of movement of cat ions and anions towards respective electrodes

7.5.3 Describe the nature of electrochemical processes

7.5.4 Determine which solutions conduct electricity in a given a set of solutions

7.5.5 Perform metal displacement reactions in aqueous medium

7.5.6 List the possible uses of an electrolytic cell

7.5.7 Sketch a Daniel cell, labeling the cathode, the anode, and the direction of flow of electrons

7.5.8 Describe how a battery produces electrical energy

7.5.9 Identify the half-cell in which oxidation occurs and the half-cell in which reduction occurs given a voltaic cell

7.5.10 distinguishes between electrolytic and voltaic cells

7.6 Electrochemical Industries:

7.6.1 Describe the manufacture of sodium metal from fused Na Cl

7.6.2 Identify the formation of by products in the manufacture of sodium metal from fused Na Cl;

7.6.3 Describe the method of recovering aluminium (metal) from alumina (ore)

7.6.4 Explain electrolytic refining of copper

7.7 Corrosion and its Prevention:

7.7.1 Define corrosion

7.7.2 Describe rusting of iron as an example of corrosion

7.7.3 Summarize the methods used to prevent corrosion

7.7.4 Explain electroplating of metals on iron (using examples of zinc, Tin and chromium plating)

8. Chemical Reactivity:

8.1 Differences between metals and non metals:

8.1.1 Differentiate between metals and non-metals based on physical and chemical properties

8.2 Metals:

8.2.1 Identify elements as an alkali metal or an alkaline earth metal

8.2.2 Explain why alkali metals are not found in the Free State in nature

8.2.3 Describe the position of sodium in periodic table, its simple properties and uses

8.2.4 Describe the position of calcium and magnesium in periodic table their simple properties and uses

8.2.5 Explain the differences in ionization energies of alkali and alkaline earth metals

8.2.6 Differentiate between soft and hard metals (iron, sodium)

8.2.7 Describe the inertness of noble metals

8.2.8 Identify the commercial value of silver, gold and platinum

8.3 Non-Metals:

8.3.1 Compile some important reactions of halogens with group I and II elements

8.3.2 Name some elements which are found in uncombined state in nature.

**For Demo tests, Test papers, Multiple choice question preparation
Aga khan board / Board of Secondary & Intermediate Education Karachi**

Visit: www.tec.edu.pk