

Herbert Morrison Technical High School
Chemistry Syllabus
Grade 9

Unit 1: Non-living Things

General Objectives

Students should demonstrate:

- 1) an understanding of the theory that matter is particulate in nature
- 2) an understanding of the three processes that provide evidence for the particulate nature of matter
- 3) an understanding that matter can be classified in a number of states; the three most common being solid, liquid and gas
- 4) an understanding of the process involved in a change of state of matter

1.1 Matter and its States

Specific Objectives

Students should be able to:

- a) define matter as anything that has mass and occupies space
- b) cite evidence to support the particulate nature of matter
(Explain diffusion, osmosis and Brownian motion.)
- c) perform experiments to demonstrate diffusion (ammonia and hydrogen chloride gases)
(Students will complete laboratory report.)
- d) perform experiments to demonstrate osmosis (potato strips in salt solution and pure water)
- e) distinguish among the three states of matter in terms of kinetic energy, arrangement of particles, forces of attraction, volume and compressibility

1.2 Change of State

Specific Objectives

Students should be able to:

- a) describe change of state in terms of kinetic energy and motion/arrangement of particles
- b) interpret and construct graphical representations of changes of state – heating and cooling curves
- c) perform experiments to determine the melting point of naphthalene from its cooling curve

Herbert Morrison Technical High School
Chemistry Syllabus
Grade 9

Unit 2: Atoms and Elements

General Objective

Students should be familiar with the concept of atoms as the building block of matter.

2.1 Atoms

Specific Objectives

Students should be able to:

- a) define the term atom

Atom – smallest part of an element that can exist and still show properties of the element

- b) draw and label diagram of the structure of an atom (only 2D representation required)
c) list the subatomic particles and their properties (relative mass, relative charge, location/position in the atom)

2.2 Elements

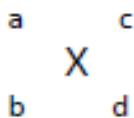
Specific Objectives

Students should be able to:

- a) define the term element

*Element – a substance made up of only one type of atom
– a substance that cannot be broken down into simpler substances*

- b) state the first twenty elements of the Periodic table (names, symbols, atomic numbers, mass numbers, numbers of protons, electrons and neutrons, electronic configurations)
c) define the terms atomic number, mass (nucleon) number and relative atomic mass
d) interpret notations of the form



where **X** is the symbol of the atom, **a** is the mass number, **b** is the atomic number, **c** is the charge and **d** is the number of items in the entity

- e) define the terms isotopy and radioactivity
f) state the isotopes of carbon and hydrogen (C-12, C-13, C-14, H-1, H-2, H-3)
g) name four radioisotopes and their uses in everyday life (C-14, Co-60, I-131, U-235)

**Herbert Morrison Technical High School
Chemistry Syllabus
Grade 9**

Unit 3: The Periodic Table

General Objectives

Students should demonstrate:

- 1) an understanding of the features which characterize metals and non-metals
- 2) an appreciation of the relationship between metals and non-metals and their uses
- 3) familiarity with the composition of certain materials and develop the ability to make reasoned choices concerning their uses

3.1 The Periodic Table

Students should be able to:

- a) describe the origin and history of the Periodic table up to the evolution of the modern Periodic table
(Scientists involved should be mentioned.)
- b) state the meaning of the following terms relating to the Periodic table and its elements: groups, periods, valence, charge, ionization

3.2 Trends in the Periodic Table

Specific Objectives

Students should be able to:

- a) outline physical trends in metallic groups
(Specific to groups I and II)
- b) identify chemical trends in group II: ease of ionisation, reactivity with oxygen, water and dilute acids
- c) outline physical trends in group VII (appearance and state at room temperature, atomic radius)
- d) identify chemical trends in group VII (ease of ionisation, oxidizing strength, reactivity)
- e) outline physical trends in the noble gases (group VIII) and the transition metals
- f) identify trends in period 3 using graduation from metallic to non-metallic properties

Unit 4: Chemical Formulae and Bonding

General Objective

Students should be aware of the different forces of attraction that exist between particles.

**Herbert Morrison Technical High School
Chemistry Syllabus
Grade 9**

4.1 Atoms, Ions and Molecules

Specific Objectives

Students should be able to:

- a) recall the definition of the term atom
- b) define the terms ion and molecule
- c) deduce that atoms make up molecules
- d) identify the atoms making up given molecules
- e) state how atoms form ions

4.2 Writing Formulae

Specific Objectives

Students should be able to:

- a) write formulae to represent ions and molecules
- b) name the classes of compounds given their formulae (binary compounds, acids, acid radicals, metallic compounds)
- c) write formulae of compounds and radicals given their names

4.3 Chemical Bonding

Specific Objectives

Students should be able to:

- a) state how atoms form chemical bonds
- b) explain why atoms form chemical bonds
- c) name two types of chemical bonds (ionic and covalent bonds)
- d) write formulae to represent ionic compounds
- e) explain the formation of ionic bonds
- f) draw structures to show the formation of ionic bonds in ionic compounds
- g) write formulae to represent covalent compounds
- h) explain the formation of covalent bonds
- i) draw structures to show the formation of covalent bonds in covalent compounds

Unit 5: Chemical Equations

General Objective

Students should appreciate that properties of chemicals will affect their reactions.

**Herbert Morrison Technical High School
Chemistry Syllabus
Grade 9**

5.1 Writing Chemical Equations

Specific Objectives

Students should be able to:

- a) write chemical formulae to represent different classes of compounds
- b) balance positive and negative charges of the ions in formulae of ionic compounds
- c) use brackets appropriately in the writing of formulae
- d) use accurate formulae to describe what is taking place in a chemical reaction (chemical equation)
- e) balance chemical equations and use state symbols appropriately for each compound in the reaction
- f) write equations to show the reactions of group II metals with water, oxygen and dilute acid

5.2 Types of Chemical Equations

Specific Objectives

Students should be able to:

- a) name the different types of chemical reactions (synthesis/direct combination, decomposition, single displacement/substitution, ionic precipitation/double displacement, neutralisation, redox and reversible reactions)
- b) identify the type of chemical reaction from a given chemical equation
- c) carry out experiments to investigate different types of chemical reactions

Unit 6: Separation of Mixtures

General Objective

Students should understand that different types of mixtures can be separated based on the properties of the components.

6.1 Mixtures

Specific Objectives

Students should be able to:

- a) define mixture as a physical combination of elements or compounds
- b) give examples of mixtures
- c) define the terms soluble, insoluble, filtrate and residue
- d) explain the differences among solutions, colloids and suspensions

Herbert Morrison Technical High School
Chemistry Syllabus
Grade 9

- e) identify different types of solutions, colloids and suspensions

6.2 Separation of Mixtures

Specific Objectives

Students should be able to:

- a) explain, with the aid of diagrams, the following separation techniques: filtration, evaporation/crystallisation, simple distillation, fractional distillation, separating funnel, use of magnet, paper chromatography
 - b) identify suitable techniques to separate mixtures based on differences in properties of the components of the mixture
-