Curriculum

Class: Grade 9 **Cycle: 3**

Subject: Chemistry **Textbook: National Textbook**

Learning Domains/Units	Objectives	Learning Outcomes/ Competencies
The Atomic Structure • Constituents of the nucleus • Energy Levels • Atomic number, mass number, isotopes, atomic mass • Electron configuration • Periodic Table		_Calculate the number of the three fundamental particles of an atom using the atomic symbol. _ Describe the arrangement of electrons around the nucleus in energy levels. _ Recognize that each energy level can hold a limited number of electrons. _ Explain what do electrons need to change their energy levels. _Know the terms atomic number (Z), mass number(A), atomic mass and isotopes. _ Represent atoms using their symbol, Z, and A. _ Write the electron configuration of the first 20 elements in the periodic table. _ Distinguish between group and period. _ Use the periodic table to classify an element as a metal, or a non-metal .

Chemical Bonding • Stability of inert gases • Formation of a chemical bond • Electron-dot symbols • Covalent bond • Ionic bond **Electrochemistry** • Electric energy from chemical reactions • Oxidation - Reduction reactions		_ Relate the chemical stability of inert gases to electron configuration. _ State the octet rule. _ Identify valence electrons. _ Draw electron dot symbols of the first 20 elements in the periodic table. _ Relate an element's valence electron structure to its position in the periodic table. _ Define chemical bonding. _ Describe chemical bonding in terms of atom's electron arrangement. _ Describe a covalent bond. _ Distinguish between single, double,, and triple covalent bonds. _ Describe an ionic bond. _Describe electrochemical cells. _ Explain a galvanic cell using a sketch, labeling the cathode, the anode, and the direction of electron flow. _ Write the equation of the half reaction: at the anode, at the cathode. Deduce the overall equation of the reaction. _ Recognize that electrical energy can be obtained from electrochemical reactions. _ Explain what oxidation numbers are and how they are assigned. _ Distinguish between oxidation and reduction reactions by definition. _ Identify oxidizing agents and reducing agents in chemical reactions. _ Recognize that oxidation and reduction are simultaneous phenomena.

Organic Chemistry • Hydrocarbons * Nomenclature * Chemical reactions • Petroleum, Natural Gas and Coal		_ distinguish between organic and inorganic compounds. _ Describe a hydrocarbon. _ Classify aliphatic hydrocarbons into alkanes, alkenes, and alkynes. _ Relate the general molecular formulas of alkanes, alkenes, and alkynes. _ Name and draw the condensed structural formulas and the structural formulas of: *The first ten normal alkanes. * The alkyl groups of the first two alkanes. _ Identify normal alkanes, branched alkanes, and cycloalkanes. _ Use IUPAC nomenclature for naming the first ten alkanes. _ Identify the isomers of alkanes for n=4 and n= 5 _ Name, draw structural formulas and condensed structural formulas of alkenes and alkynes for n= 2 and n = 3. _ Distinguish between saturated and unsaturated hydrocarbons. _ Explain and write the equations of the following reactions: complete combustion of alkanes, alkenes, and alkynes. _ Explain and write, using condensed structural formula: *substitution reactions of methane with chlorine. * addition reactions of ethene with H_2, Cl_2, HCL, and H_2O. _ Recognize that petroleum, natural gas, and coal are major sources of energy and raw materials. _ Describe the fractional distillation of petroleum.

• Synthetic materials **Chemistry and Environment** • Pollution of air, water, and soil		_ Recognize the physical properties of the constituents of petroleum during fractional distillation. _ Identify cracking. _ Differentiate between cracking and distillation. _ Define polymer and describe the process of polymerization. _ Identify addition polymerization. _ Describe the preparation of polyethene, polypropene, and polyvinylchloride. _ List physical properties of plastics. _ List the names of some pollutants. _ Identify the principle sources of pollution. _ Recognize the effects of air pollution on the environment (global warming, ozone depletion and acid rain). _ Discuss possible solutions for air pollution. _ Recognize the pollutants of soil and water pollution, the consequences of this pollution and the possible solutions.