

University College of the Cayman Islands

ASSOCIATE DEGREE SYLLABUS

COURSE NAME: INTRODUCTION TO CHEMISTRY/LAB COURSE #: CHE 201

COURSE DESCRIPTION

The purpose of this course is to introduce students to the fundamental concepts of chemistry. Many of the concepts introduced in this course are developed further in the other chemistry courses. Chemical concepts to be studied include the structure of matter, reactions and relationships in the periodic table and an introduction to organic chemistry.

Credits: 4

Prerequisite: O LEVEL/CXC/GCE PASS OR EQUIVALENT

COURSE OBJECTIVES

At the completion of this course the student will be able to:

1. demonstrate knowledge and understanding in relation to laws, definitions, concepts and theories for a given topic or set of reactions.
2. interpret mass spectra and use them to determine relative atomic and molecular masses.
3. calculate empirical and molecular formulae.
4. construct equations and perform calculations including the mole concept, involving: reacting masses.
5. understand and appreciate the theories concerning atomic structure and apply where relevant to line spectra.
6. recognize and describe number and behaviour of sub-atomic particles in atoms.
7. determine ionisation energy from emission spectral data.
8. describe the formation of ionic, covalent and metallic bonds.
9. apply valence shell electron pair repulsion(VSEPR) theory in the assessment of molecular shapes.
10. describe and explain variation in physical properties across a period.
11. interpret and use the terminology associated with organic reactions.
12. familiarise themselves with the nomenclature, general formulae and display formulae of organic compounds.
13. describe structural and geometric isomerism.
14. make critical analysis and evaluation of numerical and other data related to a given topic or set of reactions.

COURSE OUTLINE

I ATOMS, MOLECULES AND STOICHIOMETRY

Relative masses of atoms and molecules
Mole and Avogadro constant
Relative atomic and molecular masses from mass spectra
Empirical and molecular formulae using combustion data or composition by mass data
Reacting masses and molar volumes

II ATOMIC STRUCTURE

The history of the atom
Nuclides and Isotopes
Quantum numbers
Line spectra
The arrangement of electrons in energy levels
Distribution of relative charges and masses of sub-atomic particles
Ionisation energy

III PERIODICITY and Group II

Arrangement of elements
Variation of physical properties across a period: ionisation energy, electron affinity, electronegativity, atomic ionic radius and radius, melting point and electrical conductivity.
Similarities and trends in the properties of Group II metals and their compounds.

IV CHEMICAL BONDING

Ionic bonding
Covalent and dative covalent bonding
Shapes of simple molecules
Bond energies, lengths and polarity
Intermolecular forces and hydrogen bonding
Metallic bonding
Bonding and physical properties

V ENERGETICS

Heat and calorimetry
Enthalpy and bond enthalpies
First law of Thermodynamics
Disorder and entropy (qualitative)

VI CATALYSIS

Homogeneous and heterogeneous catalysis
Catalytic converters and the removal of nitrogen oxides from exhaust gases

VII INTRODUCTION TO ORGANIC CHEMISTRY

Molecular, structural and empirical formulae
Processes involved in the refining of crude oil
Alkanes, alkenes and alcohols
Alcohols and ethers
Systematic naming of alkanes and alcohols

Isomerism: structural and geometric
Combustion of alkanes

ASSESSMENT

Laboratory/Assignments	-	20%
Mid-semester Examination	-	20%
Final Examination	-	60%
Total	-	100%

REQUIRED TEXT

The following textbook(s) will be used for this course:

1. **Burton et al.**, Salters Advanced Chemistry *Chemical Ideas*, Heinemann. 2000

References

Burton et al., Salters Advanced Chemistry *Chemical Storylines*, Heinemann. 2000