

THE COLLEGE OF THE BAHAMAS
SCHOOL OF NATURAL SCIENCES AND ENVIRONMENTAL STUDIES
CHEMISTRY DEPARTMENT

COLLEGE PREP. CHEMISTRY – CHEM 071

COURSE OUTLINE

1. CLASSIFICATION OF MATTER; CHANGES; ENERGY (2 weeks)

Chemistry as the study matter, and making new substances. Using properties to identify and classify types of matter. Physical and chemical changes and properties. Word equations for changes. Homogeneous and heterogeneous material. Mixtures (including suspensions, solutions, gas mixtures and alloys). Brief review of physical methods of separation of mixtures, taught mainly in lab classes (dissolving/filtration/evaporation/crystallization, simple and fractional distillation, sublimation, chromatography, centrifugation and reverse osmosis) Pure substances. Effect of impurities on properties. Elements and compounds. Names and symbols of the first twenty elements.

2. THE ATOMIC AND KINETIC THEORY OF MATTER (2 weeks.)

The Laws of Conservation of Matter, Constant Composition, and Multiple Proportions. Dalton's Atomic Theory as an explanation of these laws. Formulae as showing ratio of numbers of atoms of different elements combined in compounds.

Evidence for the particulate nature and Kinetic Theory of matter (diffusion in gases, liquids, and solids. Brownian motion. Volume changes on dissolving solutes in solvents). Size of particles - the oil drop experiment. The physical properties of the three states of matter explained in terms of particle arrangement, forces between particles, and movement of particles. Temperature related to kinetic energy of particles. Changes of state explained on the Kinetic Theory. Pressure and s.v.p. The gas laws, including sketch graphs and simple calculations, stressing proportionality.

3. ATOMIC STRUCTURE AND BONDING (3½ weeks.)

Protons, electrons and neutrons. Proton number, mass number, isotopes. Electronic configuration. Ionic and covalent bonding in simple binary compounds. Naming of ionic and of binary covalent compounds. Properties of ionic and covalent compounds. Empirical and molecular formulae. Their relationship to giant ionic or small molecular structures. Metals and non-metals. The Periodic Table, based on properties, and explained by electronic configurations. The relationship between valency, electronic configuration and the Periodic Table. The formulae and charges for common ions and radicals. Valency applied to simple covalent formulae.

4. CHEMICAL EQUATIONS (1½ weeks)

Writing and balancing full equations and simple ionic equations, including state symbols. ΔH notation for energy changes. Types of reaction: -synthesis, decomposition, partner exchange, redox, acid/base (see below).

5. ACIDS, BASES AND SALTS (3 weeks)

Simple properties and reactions of acids (with indicators, bases, metals, carbonates, hydrogencarbonates, sulphites and hydrogensulphites) and of bases, including both full and ionic equations where appropriate. Definition of acids and bases according to the Bronsted-Lowry theory (in aqueous solution only). Neutralization. Strong and weak acids and bases. the pH scale (qualitatively only). Common indicators - litmus, methyl orange, phenolphthalein, universal indicator. Salts as the product of an acid/base reaction. Normal and acid salts. Solubility of salts (qualitative) and methods of preparation of salts related to these solubilities. Equations for these preparations.

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6. OXIDATION AND REDUCTION (1/2 week)

Simple examples involving oxygen or hydrogen

EVALUATION

Tests and Assignments	20%
Laboratory	15%
Mid-Term Test	15%
Final Examination	50%

TEXTBOOK

Banks, F. B., *College Prep Chemistry*, 4th Edition – available in college book shop

READING LIST

Lewis, M. & Waller, G. *Thinking Chemistry*
GCSE Ed. Oxford University Press, 1986. ISBN 0-19-914257-2

Daube, G.W. & Seese, W.S., *Basic Chemistry*
Alternate Ed. Prentice Hall, 1992. ISBN 0-13-059452-0

Malone, L.J. *Basic Concepts of Chemistry*
3rd Ed. Wiley, 1989. ISBN 0-471-84930-8

LABORATORY WORK

The laboratory work translates the theoretical principles met in the lecture course into practical laboratory situations.

1. Investigation of Physical and Chemical Change
2. Separation of Mixtures 1
3. Separation of Mixtures 2
4. Determination of Melting Points
5. Atoms and Molecules
6. Preparation of Copper(II) Oxide
7. Analysis of Copper(II) Oxide
8. Acids, Bases and Salts
9. Preparation of Salts: 1
10. Preparation of Salts: 2

EVALUATION

Each Lab will be assessed		
Laboratory Work	10 labs @ 10%	100%

TEXTBOOK

CHLB 071 Laboratory manual produced by the Chemistry Department.