

SAULT COLLEGE
of Applied Arts and Technology
Sault Ste. Marie

COURSE OUTLINE

CHM 115-4
GENERAL CHEMISTRY THEORY

revised October, 1979 by J. Korrey



CHM 115-4

General Chemistry Theory

General Chemistry theory is taught to students in the Chemical Engineering Technician and Medical Laboratory Technology programs in both the first and second semesters. The course consists of four hours per week with three hours being devoted to theory and one hour spent on solving related problems.

CHM 115-4 is taught in the first semester of the program and is a prerequisite for CHM 125-4 which is a continuation of General Chemistry theory in semester 2.

UNIT I - Basic Concepts

The first part of this unit reviews the basic units of measure in the S.I. system and methods of conversion normally encountered in science courses. The latter part describes various methods of separating matter into pure substances and techniques for their eventual identification.

Topics discussed are:

Units of Measure - Length, Volume, Mass and Temperature. Uncertainty in measurements, significant figures, conversion of units, S.I. units.

Kinds of Substances - Identification of pure substances, separation of matter into pure substances by distillation, fractional crystallization and chromatography.

UNIT II - Atoms, Molecules & Ions

In order to explain differences in properties of pure substances, this unit considers the particle structure of matter, ie: the "building blocks" of elements and compounds - atoms, molecules and ions.

Topics discussed are:

Atomic theory is studied with emphasis on:

The work of Newton, Dalton, Thompson, Rutherford & Milliken

The Laws of Conservation of Mass and Multiple Proportions, Constant Composition.

The Fundamental Particles of the Atom - The Electrons, Protons & Neutrons

Atomic No., Mass No., Isotopes

Molecules, Molecular & Structural Formulae

Ions, Atomic Masses, Avogadro's No., Molecular Mass.

UNIT III - In Unit II, we discussed the building blocks of matter: atoms, molecules and ions. In Chemistry the structures of substances containing these particles are represented by chemical formulas. This unit deals with different types of formulas and their use in balanced equations.

Topics discussed are:

Chemical Formulae, Nomenclature & Equations - In this unit we discuss:

- simplest & molecular formulae
- obtaining simplest formulae and molecular formulae by analysis
- the use of the mole
- chemical equations & calculations involving mass relations, limiting reagent, theoretical & actual yield.

*Note: In addition to all of these topics a great deal of emphasis is placed on formulae writing, nomenclature and the balancing of equations.

UNIT IV - The Physical Behaviour of Gases

Continuing our study of matter we know pure substances exist as gases, liquids and solids. This unit will be devoted to the study of gases.

Topics discussed are:

- Some general properties of gases
- Methods of measuring pressure
- The gas laws: The Ideal Gas Law
 - Boyle's Law
 - Charles' & Gay - Lussac's Law
 - Avogadro's Law
 - The combined gas Law
 - Dalton's Law of Partial Pressure
- Real Gases
- The Kinetic Theory of Gases
- Graham's Law of Effusion

UNIT V - Liquids and Solids; Phase Changes

In the previous unit, we discussed the laws governing the physical behaviour of gases and the interpretation of these laws in terms of the Kinetic Theory.

- Water as a solvent; Electrolyte solutions
- Conductivity of Water solutions
- Natural sources of water
- Water pollution and types of pollutants
- Water purification
 - removal of suspended matter
 - disinfection
 - removal of taste and odor
 - Water softening methods
 - desalination by distillation, reverse osmosis, ion-exchange