

**THE UNIVERSITY OF ZAMBIA
SCHOOL OF NATURAL SCIENCES
DEPARTMENT OF CHEMISTRY**

22nd February 2021

CHE1000: INTRODUCTION TO CHEMISTRY

INTRODUCTION:

1. The topics to be covered are:

A: STOICHIOMETRY

Measurements, Elementary idea of atom, Mole concept, Chemical formula, Calculations based on chemical equations, Reaction types, Balancing redox reaction equations

B: GASES

Nature of gases, The gas laws, Ideal Gas Law, Gas stoichiometry; Dalton's law of partial pressures, Elementary treatment of the kinetic theory, Graham's law of effusion and diffusion, Van der Waals equation.

2. Recommended **Text Book:**

Chemistry - Steven S. Zumdahl and Susan S Zumdahl, Eighth Edition (Brooks / Cole)
Chapter 1,2,3,4 and 5- (Pages 1-234)

3. Objectives:

When you have mastered these topics you should be able to do the followings:

- (i) perform mathematical manipulations with proper attention to units and significant figures
- (ii) write balanced molecular and ionic equations
- (iii) calculate amounts of chemicals involved in reactions based on balanced chemical equations and the mole concept.
- (iv) calculate the empirical and molecular formula from elemental analysis data
- (v) identify and predict the outcome of the various types of chemical reactions including acid-base and precipitation reactions.
- (vi) calculate theoretical and percentage yield
- (vii) recognize oxidation-reduction reactions using the concept of oxidation numbers
- (viii) balance oxidation-reduction reactions
- (ix) recall general properties of gaseous state

- (x) postulates of kinetic theory of gases
- (xi) perform calculations based on gas laws
- (xii) perform stoichiometric problems with gas Volumes, molecular weight determinations.

Key Words:

- A: Measurements, uncertainty, Precision, Accuracy, random error, systemic error, calibration, significant figures, SI units, fundamental units, derived units, extensive property, intensive property, matter, physical property, chemical property, chemical change (reaction), law of conservation of mass, law of definite proportion, composition % by mass, law of multiple proportions, atoms, proton, neutron and electron, atomic number, mass number, atomic symbol, isotope, mass spectrometry, isotopic mass, relative atomic mass, chemical formula, empirical formula, molecular formula, structural formula, mole, Avogadro number, molar mass relative molecular mass, chemical equations, reactants, products, balancing equation, limiting reactant, theoretical yield, side reactions, actual yield , % yield, combination, displacement, decomposition, metathesis, precipitation, precipitate, molecular equation, total ionic equation, spectator ion, net ionic equation, neutralization, acid, base salt, titration, indicator, equivalence point, end point, reduction, oxidation, oxidizing agent reducing agent, oxidation number balancing redox equation
- B: Pressure, Torr, Pascal, atmosphere, millimeters of mercury, ideal gas, real gas, Boyle's law, Charles' law, Avogadro's law, molar volume, STP, RTP, universal gas constant, ideal gas law, partial pressure, mole fraction. Kinetic molecular theory, rms speed, effusion, diffusion, van-der Waal's equation, van der Waal's constants.