### REVIEW GUIDE FOR EXAM 1 CHEM 141

### Chapter 1

Scientific Method

MATTER

Be able to classify matter into the below scheme.

Homogeneous

Pure Substances

Elements

Compounds

Solutions

Heterogeneous

Understand how mixtures can be homogeneous or heterogeneous

Be able to identify a property as physical or chemical

Be able to identify a physical property as extensive or intensive

Be able to identify a change as physical or chemical

UNITS OF MEASUREMENTS

Know the SI Base Units

Kilogram Mass

Meter Length

Second Time

Kelvin Temperature

Mole Amount of Substance

Ampere Electric Current

Candela Luminosity

Know the following SI Contrived Units

Liter Volume 1mL = 1 cm3

Newton Force

Joule Energy

### Pascal Pressure

SI Prefixes – know how to convert between different prefixes

– know how the prefixes from nano- to giga-

TEMPERATURE

Given the equation, know how to convert from Fahrenheit to Celsius and Celsius to Fahrenheit

Know the equation and how to convert from Celsius to Kelvin and Kelvin and Celsius

K = °C + 273.15

Given a new temperature scale to write the y=mx+b equation

PRECISION AND ACCURACY

Know difference between them

Be able to do % error and standard deviation

SIGNIFICANT FIGURES

Know how to judge the number of significant figures in a number

Know how to add, subtract, multiply and divide numbers and report the proper number of

SF

#### DIMENSIONAL ANALYSIS

Be able to apply dimensional analysis to the conversion of units

Know the definition for density

Be able to apply dimensional analysis to do calculations involving density

### Chapter 2

FUNDAMENTAL CHEMICAL LAWS

Know the Law of Conservation of Mass

Know the Law of Definite Composition

Know the Law of Multiple Proportions

Know the consequence of each law as pertains to the study of chemistry

ATOMIC STRUCTURE

Understand Thomson’s, Milliken’s and Rutherford’s experiments and how they helped reveal the structure of the atom.

Atoms are made of protons, neutrons, and electrons

Atomic number is the number of protons

Mass number is the number of neutrons and protons

Charge of atoms depends on number of electrons relative to atomic number

Know the significance of the Chadwick’s discovery of the neutron

Know parts of atomic symbol

Know what an isotope is

Know how to calculate an average atomic mass

CLASSIFICATION OF ELEMENTS

Know difference between metal, metalloid and nonmetal

-what are characteristics of each

Be able to identify element as metal, metalloid or nonmetal

Know groups of elements

Alkali metals

Alkaline earth metals

Chalcogens

Halogens

Noble gases

Transitions Metals

Rare Earths

Know the molecular elements

IONIC COMPOUNDS

Know how to name ionic compounds

Know how find charge of monatomic ions from periodic chart

Know how to combine ions to form a proper ionic compound

EMPIRICAL FORMULA

Know relationship between empirical formula and molecular formula

NOMENCLATURE

Know the names and charges of common ions as given in nomenclature handout

Know how to name ionic compounds

Know how to name nonmetal-nonmetal compounds

Know how to name binary acids and oxyacids

Know how to name hydrates

Be sure to be able to write the name of a compound from its chemical formula

### Chapter 3

CHEMICAL EQUATIONS

Know how to balance chemical equations

Know why chemical equations need to be balanced

GENERAL TYPES OF REACTIONS

Be able to identify the following reactions

Redox

Combustion

- products are CO2, H2O

Decomposition

- including decomposition of carbonates, chlorates and perchlorates

Combination

Single Replacement

Neutralization

Double replacement ppt

FORMULA WEIGHTS

Know how to calculate formula weights

THE MOLE

Know Avogadro’s number and the definition of a mole

Know how to calculate the average molar mass for an element

Know how to convert between the mass of a substance, the number of moles and the number of molecules of substance Grams ↔ Moles ↔ Number

- use molecular weight and/or Avogadro’s number

Know the relationship between the definition of the mole and the atomic mass unit

STOICHIOMETRY

Know significance of coefficients within a balanced chemical equation

Know how to calculate an empirical formula for a compound from its mass percentages

Know how to calculate an empirical formula for a compound from its combustion

analysis

Know how to calculate theoretical yield

Grams ↔ Moles ↔ Moles ↔ Grams

Know how to calculate the amount of product made and amount of reactant used in a limiting reagent problem by ICE method

Know how to calculate the percent yield

### Chapter 4

AQUEOUS PHASE

Understand the attractions involved in the creation of an aqueous solution

Know how soluble salts dissociate

ELECTROLYTES

Know the difference between an electrolyte and nonelectrolyte

Know the difference between a strong electrolyte and weak electrolyte

Know the physical basis for the term electrolyte

ACIDS AND BASES

Know the difference between an acid and a base

Be able to differentiate between a strong acid and a weak acid

Be able to differentiate between a strong base and a weak base

Know what a neutralization reaction is

IONIC EQUATIONS

Know how to properly dissociate a salt into its ionic components when dissolved in water

Know how to write an total ionic equation and a net ionic equation

Know what is meant by spectator ions

METATHESIS REACTIONS

Know three driving forces of metathesis reactions

formation of precipitate

formation of nonelectrolyte (weak electrolyte)

formation of gas

Know the solubility rules

Be able to predict products of a metathesis reaction

OXIDATION-REDUCTION REACTIONS

Know difference between oxidation and reduction

Know oxidation number. Oxidizing and reducing agent

Balance redox reaction by ½ reaction method

BASICS OF SOLUTIONS

Know difference between solvent and solute

Molarity

Know definition of molarity

Know how to calculate moles of solute given a volume and the molarity of

solution.

Dilutions

Know how to calculate dilutions

Understand the laboratory procedure for making dilutions

SOLUTION STOICHOIMETRY

Be able to apply principles of solutions within a stoichiometric problem

Limiting Reactants

Redox titration