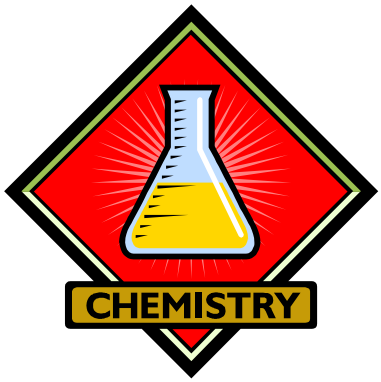
Honors Chemistry 2:
Unit 1 Review

Introduction



Students should be able to:

- ✓ Distinguish between physical and chemical properties and changes.
- ✓ Understand the difference between elements, compounds, and mixtures.
- ✓ Be familiar with the units of the metric system of measurement and the temperature scales.
- ✓ Be able to convert measurements, especially within the metric system, by using dimensional analysis.
- ✓ Determine the number of significant figures in a measurement and be able to express the results of a calculation with the proper number of significant figures.

Keywords:

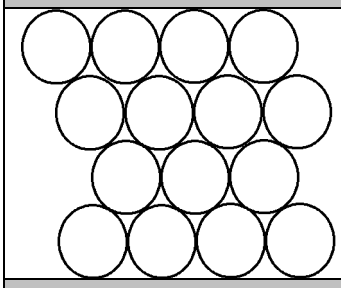
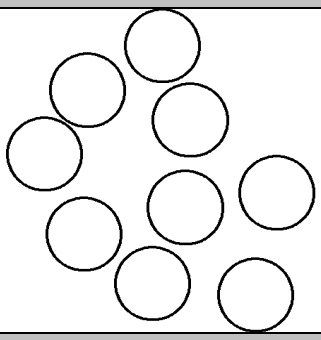
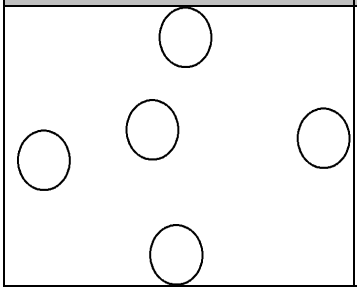
(pure) substance	element	compound
mixture	solution	volatile
law of constant composition (law of definite proportions)	physical properties	chemical properties
intensive properties	extensive properties	physical change
chemical change	density	precision
accuracy	exact numbers	significant figures
atom	molecule	

Chemistry –

I. Introduction to Matter

A. What is Matter?

B. What are the states of matter?

	SHAPE	VOLUME	PARTICLE MOTION
			
			
			

C. Pure Substance –

D. Chemical vs. Physical Properties

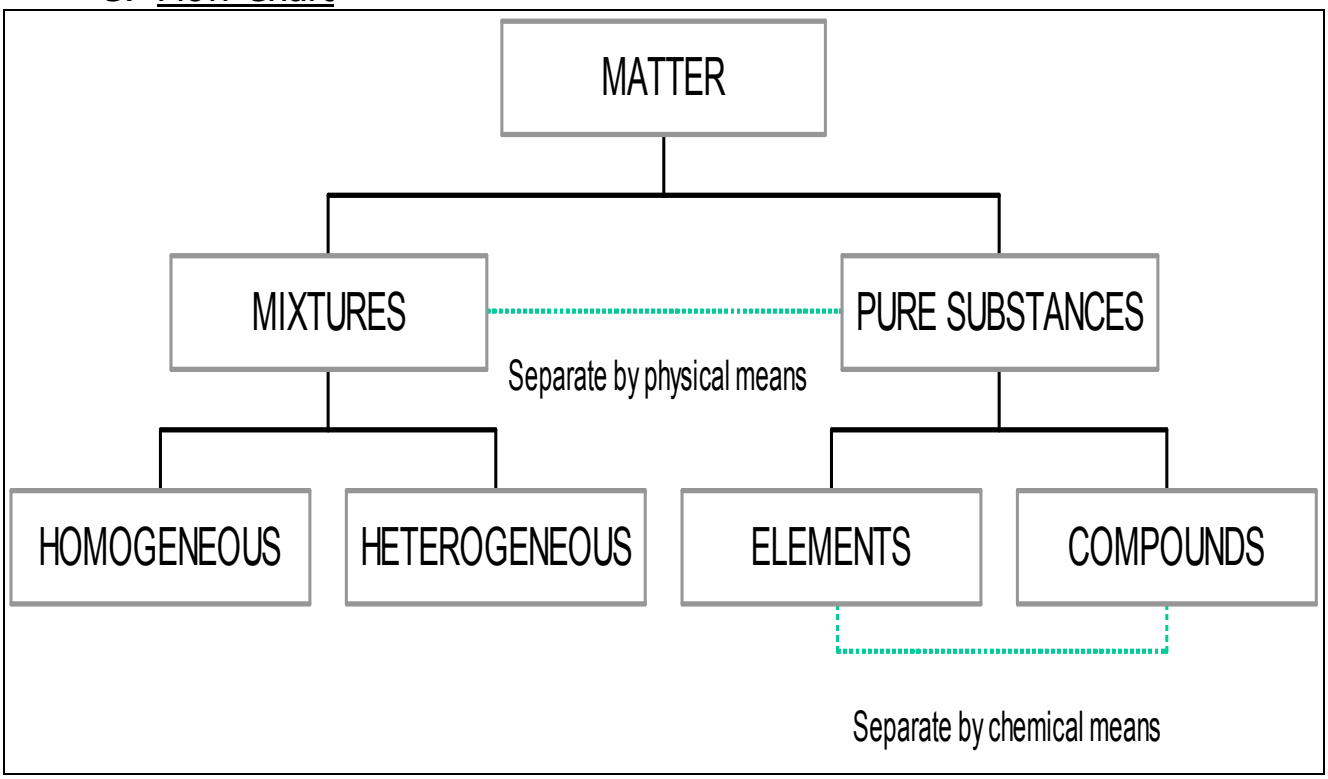
E. Physical vs. Chemical Change

F. Mixtures –

a. homogeneous mixture –

b. heterogeneous mixture –

G. Flow Chart



II. Elements and Compounds

A. What is an Element?

B. What is a Compound?

C. What is a Molecule?

D. What is the Law of Constant Composition (Law of Definite Proportions)?

III. Units of Measurement

A. The Metric System –

B. SI Units **(Système International d'Unités)**

Base Quantity	Name of Unit	Symbol
Mass	Kilogram	kg
Length	Meter	m
Time	Second	s
Amount of Substance	Mole	mol
Electric Current	Ampere	A
Luminous Intensity	Candela	cd
Temperature	Kelvin	K

Prefix	Symbol	Meaning
Mega	M	10^{6}
Kilo	k	10^{3}
Base	Unit	10^{0}
Deci	d	10^{-1}
Centi	c	10^{-2}
Milli	m	10^{-3}
Micro	μ	10^{-6}
Nano	n	10^{-9}
Angstrom	Å	10^{-10}
Pico	P	10^{-12}

C. Derived Units –

D. **Intensive vs. Extensive Properties**

1. Intensive Properties

Example =

2. Extensive Properties

Example =

E. Sample Exercise 1.3 – (a) Calculate the density of mercury if 1.00×10^2 g occupies a volume of 7.36 cm^3 . (b) Calculate the mass of 65.0 cm^3 of mercury.

IV. Uncertainty in Measurement

A. Exact vs. Inexact Numbers

1. Exact Numbers

Example =

2. Inexact Numbers

Example =

B. Precision and Accuracy

1. **Precision** –

2. **Accuracy** –

C. Significant Figures

1. Rules for Determining Significant Figures in Numerical Data

1. Any non-zero integers are always counted as significant figures.
2. Leading zeros are those that precede all of the non-zero digits and are never counted as significant figures.
3. Captive zeros are those that fall between non-zero digits and are always counted as significant figures.
4. Trailing zeros are those at the end of a number and are only significant if the number is written with a decimal point.
5. Exact numbers have an unlimited number of significant figures. (Exact numbers are those which are as a result of counting e.g. 3 apples, or by definition e.g. 1kg = 2.205lb).
6. In scientific notation the 10^x part of the number is never counted as significant.

SAMPLE EXERCISE 1.5 – How many significant figures are in each of the following numbers (assuming that each number is a measured quantity:

(a) 4.003 _____

(b) 6.023×10^{23} _____

(c) 5000 _____

2. Rules for Determining Significant Figures in Calculations

1. When multiplying or dividing. Limit the answer to the same number of significant figures that appear in the original data with the fewest number of significant figures.
2. When adding or subtracting. Limit the answer to the same number of decimal places that appear in the original data with the fewest number of decimal places.

i.e. don't record a greater degree of significant figures or decimal places in the calculated answer than the weakest data will allow.

SAMPLE EXERCISE 1.6 – A person's height is measured to be 67.50 in. What is this height in centimeters? (1 in. = 2.54 cm)

SAMPLE EXERCISE 1.7 – A gas at 25°C exactly fills a container previously determined to have a volume of 1.05×10^3 cm^3. The container plus gas are weighed and found to have a mass of 837.6 g. The container, when emptied of all gas, has a mass of 836.2 g. What is the density of the gas at 25°C?

V. Dimensional Analysis (Factor – Label Method)

A. Dimensional Analysis- a problem solving technique:

This technique allows you to convert between units by the use of conversion factors.

$$\text{Given Unit} \times \frac{\text{Desired Unit}}{\text{Given Unit}} = \text{Desired Unit}$$

B. Sample Exercise 1.8 – A man weighs 185 lb. What is his mass in grams?

C. Sample Exercise 1.9 – What is the mass in grams of 1.00 gal of water? The density of water is 1.00 g/mL.

D. Sample Exercise 1.10 – A certain printed page has an average of 25 words per square inch of paper. The average length of the words is 5.3 letters. What is the average number of letters per square centimeter of paper?