CHM 100
Chapter 2 Study Guide / Learning Objectives

Chapter 2 in your textbook deals with chemical measurements. Since chemistry is a science that depends on precise (repeatable) quantitative measurements, it's important that we are familiar with how measurements are obtained and how they are reported to others. We discussed the metric system and a method to convert between different types of units (dimensional analysis). We also discussed significant figures as a means to tell others how precise our measurements are.

After reading Chapter 2 and your class notes, you should be able to:

[Definitions]
- Define accuracy.
- Define precision.
- Describe how accuracy and precision are different but related concepts.
- Define measurement and unit.
- Define these metric terms: base unit (fundamental unit), derived unit, metric prefix
- Define volume and density and list the units used to measure both.

[Scientific notation]
- Convert a decimal number in scientific notation.
- Convert a number in scientific notation to decimal.

[The metric system]
- List the base units of mass, temperature, length, and time in the metric (SI) system.
- Memorize and be able to apply these metric prefixes: k, c, m, μ .
- Apply other metric prefixes if you are given their definition.
- Find the units of volume and density.
- Convert from one metric unit to another using the method of dimensional analysis.

[Significant figures]
- Write a measurement that you have obtained from a measuring device (balance, ruler, graduated cylinder, etc.) using the correct number of significant figures.
- Given a measurement, tell how many significant figures it has. This will require that you be able to differentiate between zeros used as placeholders and zeros that have been measured.
- Be able to add or subtract measurements, rounding the result to the correct number of significant figures.
- Be able to multiply or divide measurements, rounding the result to the correct number of significant figures.
- Be able to perform multi-step calculations (sequences of additions / multiplications / etc.) using measurements, rounding the result to the correct

number of significant figures.

[Other calculations]

- Using the formula $density = \frac{mass}{volume}$, calculate any term given the other two. (Example: calculate density given mass and volume)
- Be able to convert between Celsius, Fahrenheit, and Kelvin temperatures given the appropriate formulas. You do not have to memorize these formulas.

[Practice]

- (p48-55) Q&P 6, 8, 10, 14, 24, 26, 28, 32, 36, 38, 40, 48, 52, 60, 62, 76, 88, 92, 94, 96

Here are a few more dimensional analysis problems and their answers - if you'd like extra practice:

1246 mm to cm

- $1246\,\text{mm} \times (\frac{10^{-3}\,\text{m}}{\text{mm}}) \times (\frac{\text{cm}}{10^{-2}\,\text{m}}) = \mathbf{124.6\,cm}$

1.4x10^5 μm to mm

- $1.4 \times 10^5\,\mu\text{m} \times (\frac{10^{-6}\,\text{m}}{\mu\text{m}}) \times (\frac{\text{mm}}{10^{-3}\,\text{m}}) = \mathbf{140\,mm}$

64.5 mL to L

- $64.5\,\text{mL} \times (\frac{10^{-3}\,\text{L}}{\text{mL}}) = \mathbf{0.0645\,L}$

0.074 m^3 to cm^3 (this is an example of a cubed unit. For cubed units, we apply the conversion factor three times!)

- $0.074\,\text{m}^3 \times \frac{\text{cm}}{10^{-2}\,\text{m}} \times \frac{\text{cm}}{10^{-2}\,\text{m}} \times \frac{\text{cm}}{10^{-2}\,\text{m}} = \mathbf{74000\,cm^3}$

15700 m to km

- $15700\,\text{m} \times (\frac{\text{km}}{10^3\,\text{m}}) = \mathbf{15.7\,km}$

1.37x10^{-2} km to cm

- $1.37 \times 10^{-2}\,\text{km} \times (\frac{10^3\,\text{m}}{\text{km}}) \times (\frac{\text{cm}}{10^{-2}\,\text{m}}) = \mathbf{1370\,cm}$