

2 • What Can We Measure About Chemicals?

STUDY LIST

How Do We Communicate About Chemicals?

I can...

- Find the mass of any atom (in amu's) on a periodic table.
- Write symbols and names for the 40 elements memorized in class.
- Give examples of atoms, molecules, elements, and compounds.
- Calculate the mass of a molecule given its formula.
- State the # and kind of atoms in formulas using parentheses [ex., $\text{Ca}(\text{NO}_3)_2 \approx \text{CaN}_2\text{O}_6$]
- List the seven diatomic elements.
- Write the fraction composition (by mass) for the elements in a compound.
- Calculate the % composition (by mass) given the fraction composition.

How Are Measurements Different from Regular Numbers?

- Recognize the difference between accuracy (how close measurements are to a "true" value) and precision (how close measurements are to each other).
- Measure length, mass, and volume with the correct precision.
- Round off long numbers to a specified decimal place.
- Write very large or very small numbers in scientific notation.
- Analyze class data to indicate accuracy using % error. (I know the formula.)
- Analyze class data to indicate precision using \pm notation or significant figures.
- Define significant figures as all those of which you are certain plus one more that involves judgment of the observer.

How Can I Show That My Calculations Are Correct?

- Write equalities as conversions factors.
[ex., $\frac{1 \text{ mile}}{5280 \text{ feet}}$]
- Use "dimensional analysis" to set up problems that convert one unit to another.
- Calculate answers from a dimensional analysis set up.
- State Avogadro's # (6.02×10^{23} molecules in a mole).
- State that 1 mole of a gas has a volume of 22.4 Liters at STP.
- Calculate the molar mass (gram molecular mass) of any substance using the periodic table.
- Use the above three conversions in dimensional analysis problems.
- State that STP stands for Standard Temperature (0°C or 273 K) and Pressure (1 atm or 760 mmHg).
- List the three metric prefixes (centi-, milli-, and kilo-) as conversion factors for Liters (volume), meters (length), and grams (mass).
- Enter numbers written in scientific notation into a scientific calculator.

Why Is Density A Useful Property of Matter?

- Define density.
- Calculate density from measurement data.
- Show calculations with enough detail so errors can be recognized.
- Make a simple data table with labels, units, and straight lines.
- Explain that since density does not depend on the size of the sample, it is more useful for identifying substances than mass or volume.