

CHM2045
Fall 2017
Week Three

Reading: Zumdahl – Chapter 3

Background: A lot of conversations I have go like this.

Me: “Hi, I’m Mike. I teach chemistry.”

Moderately interested person: “Oh. I hate chemistry. What was that, Avogadro’s number?”

Me: (Pause) “That’s nice. I think I’ll get out of the pool now.”

Certain things are really memorable in a chemistry class. One of them is the number of things in a mole of something. We have our old pal Avogadro to thank for that. Through careful experimentation he uncovered a constant that is all over the place in the sciences ($L = 6.022 \times 10^{23}$). His constant tells us that a mole of something has 6.022×10^{23} things in it, the same way a dozen of some is 12 of that thing. This will come in handy, because we track chemical reactions (next week) in terms of the number of particles reacting, not their masses.

Being able to compare various substances based on their relative amounts (moles of atoms) becomes handy, and it allows us to give meaning to composition on a percentage basis. Knowing the formula of a compound we can determine the % mass composition for each element. Using moles, we can go from % mass composition to a formula. That is handy when your researcher says, “I don’t know what it is, but I do know that it is 72% carbon...”. This will lead us in to empirical and molecular formulas.

Learning Outcomes:

By the end of this week, a student should be able to:

1. Convert between mass, moles, and atoms for any given element.
2. Convert between mass, moles, and atoms for any given compound.
3. Determine the mass composition of a formula.
4. Determine the empirical and molecular formula of a compound.

Suggested Problems: 3.37, 3.39, 3.47, 3.63, 3.65, 3.69, 3.73, 3.83, 3.85, 3.81, 3.91