

CHAPTER 2 ATOMS, MOLECULES, AND IONS

Chapter Learning Goals for Students

Section 2.1 Explain the law of a) conservation of mass and b) definite proportions.

Section 2.2 Explain the law of multiple proportions.
 For two different compounds comprised of the same two elements, show that the law of multiple proportions is obeyed.
 Do Problem 1, 34, 40, 42, 46, 48, 50,

Section 2.3 Explain information about the atom revealed by the experiments of a) Thomson and b) Millikan, c) Rutherford.
 Describe the atom in terms of the composition, mass, and volume of the nucleus relative to the mass and volume occupied by the electrons.

Section 2.4 Explain the information about the atom revealed by the experiments of Rutherford.
 Describe the atom in terms of the composition, mass, and volume of the nucleus relative to the mass and volume occupied by the electrons.
 Perform calculations using atomic size.

Section 2.5 State the difference between atoms and elements.
 Given the symbol for an isotope of an atom or ion, determine the number of protons, neutrons, and electrons.

Section 2.6 Given the mass and natural abundance of all isotopes of a given element, calculate the average atomic mass of that element.

- For any element, calculate a) the mass in grams of a single atom and b) the number of atoms in a given number of grams.
- For any element, convert from mass to moles and moles to mass.
- For any element, convert from moles to actual number using Avogadro's number, and visa versa.
- Do Problems 2 – 10, and the even ones from 54 – 72.

Section 2.7 Be able to write the isotope of an element in the form: ${}^A_Z E$. Know Z is the atomic number, the number of protons, E is the atomic symbol, and A is its mass number, the number of neutrons + protons.

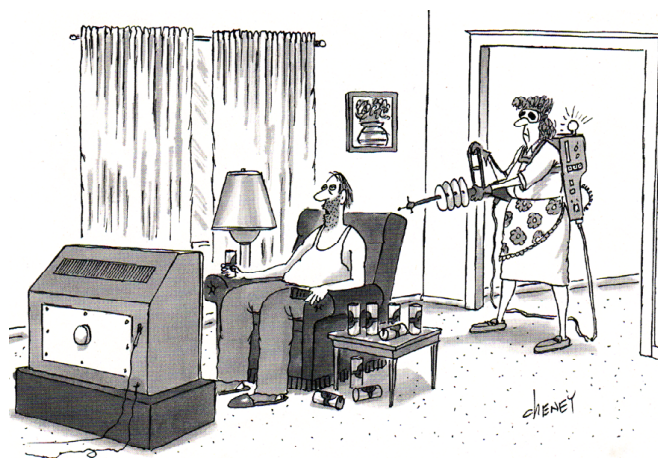
Section 2.8 Know the fundamental nuclear processes and how to balance equations using isotopes. The fundamental processes includes alpha particles, beta particles, gamma rays, positrons, and electron capture. Be able to balance equations with these particles.

Section 2.9 Nuclear stability. Know the sea of stability and how to predict if a nucleus is stable or not.
 Do Problems 11 – 14, and the even ones from 74 – 88.

Section 2.10 Covalent bonds. Know the difference between a) compounds and mixtures and b) heterogeneous and homogeneous mixtures, and c) atoms and molecules.
 Know various representations of pure substances: (a) chemical formulas, (b) structural formulas, (c) molecular models, (d) ball-and-stick models and (e) space-filling models.

Section 2.11 Ionic bonding. Know the difference between covalent bonds and ionic bonds.
 Relate structural formulas to chemical formulas.
 Identify which substances are ionic and which are molecular.
 Do Problem 15 and 16, 32, 36, and 90 – 100, even only.





"Yes, Thelma, I heard you — you're going to turn me into a cloud of sodium ions."

Section 2.12 Give the formulas and names of a) common polyatomic ions, b) ionic compounds, c) binary molecular compounds, d) common acids.

- Know all of the names of the ions on your flash cards.
 - Do Problems 21 – 29 and the even ones between 102 - 112
- Do the problems on the worksheet and check results with answers at website. (Skip acids for now)

Advice from a former student:

Talk to your teacher. The professors have office hours that are open to students for any questions. If you are having any difficulties and can't seem to catch them during office hours, make an appointment or talk to the professor after lecture.



Early chemists describe the first dirt molecule.

Advice from a former student:

Work harder than you think you should for the first month and you will be happy with how well it sets you up for the rest of semester. You will understand the basics well and that will carry you through the harder chapters without having to back track.