Homework Problem 1 – Due January 17, 2023

Note: the question labels refer to the 12th edition of our textbook.

Answer all questions with a (short) paragraph or 2 explaining your reasoning, as well as a numerical answer as appropriate. You must submit your final solution in machine-readable form (text or MS Word document, .pdf, .jpg, LaTeX,…) via CANVAS.

11.4

How does the approximate number of atoms in the air in your lungs compare with the number of breaths of air in Earth's atmosphere? (Give approximate numbers, assuming that one breath of air is about 1 liter. Show your math!)

11.46

A particular Atom contains 29 electrons, 34 neutrons and 29 protons. What is the identity of this element, and what is its atomic number?
EXTRA: What is the atomic MASS of this isotope? If I were to remove one electron, would it change into a different element?

11.52

You could swallow a capsule of germanium without ill effects. But, if a proton were added to each of the germanium nuclei, you would not want to swallow the capsule. Why not? (Consult the periodic table)

11.62

Where were the atoms that make up a newborn infant "manufactured"?

11.64 (slightly changed!)

Assume you have one kilogram of pure carbon, and another kilogram of pure oxygen. Discuss why these equal masses of carbon atoms and oxygen atoms don't contain the same number of atoms.
EXTRA: Do those 2 equal masses contain the same number of electrons, though? (roughly)