

Homework 1

September 9, 2022

Weekly homework assignments are posted approximately one week prior to the due date. Collaborations are encouraged and students must report all collaborators in writing on each assignment. All external sources (websites, books) must be properly cited. Additional problems are listed at the end of each assignment. This week's assignment is due *Fri, Sept 16th at 11:59pm*.

The Atom and Isotopes

1) True or false. If false, change the statement to make it true. (1 pt)

- If an atom has an unequal number of protons and electrons, it will be charge-neutral.
- Electrons are attracted to protons.
- Protons and electrons have charges of the same magnitude but opposite sign.
- Some atoms don't have any protons.
- Protons have twice the mass of neutrons.
- Electrons are much heavier than neutrons and protons.

Conservation of Mass

2) A volatile liquid (one that readily evaporates) is put into a jar, and the jar is then sealed. Does the mass of the sealed jar and its content change upon the vaporization of the liquid? (1 pt)

Atomic Mass

3) An element has four naturally occurring isotopes with the masses and natural abundances given here. Find the atomic mass of the element and identify it. (1 pt)

Isotope	Mass (amu)	Abundance (%)
1	135.90714	0.19
2	137.90599	0.25
3	139.90543	88.43
4	141.90924	11.11

4) Gallium has two naturally occurring isotopes with the following masses and natural abundances: (1 pt)

Isotope	Mass (amu)	Abundance (%)
Ga-69	68.92558	60.108
Ga-71	70.92470	39.892

5) Silicon has three naturally occurring isotopes (Si-28, Si-29, and Si-30). The mass and natural abundance of Si-28 are 27.9769 amu and 92.2%, respectively. The mass and natural abundance of Si-29 are 28.9765 amu and 4.67%, respectively. Find the mass and natural abundance of Si-30. (1 pt)

Optional Textbook Problems: Ch. 2- 2.31 – 2.79 odd, 2.145 – 2.153 odd