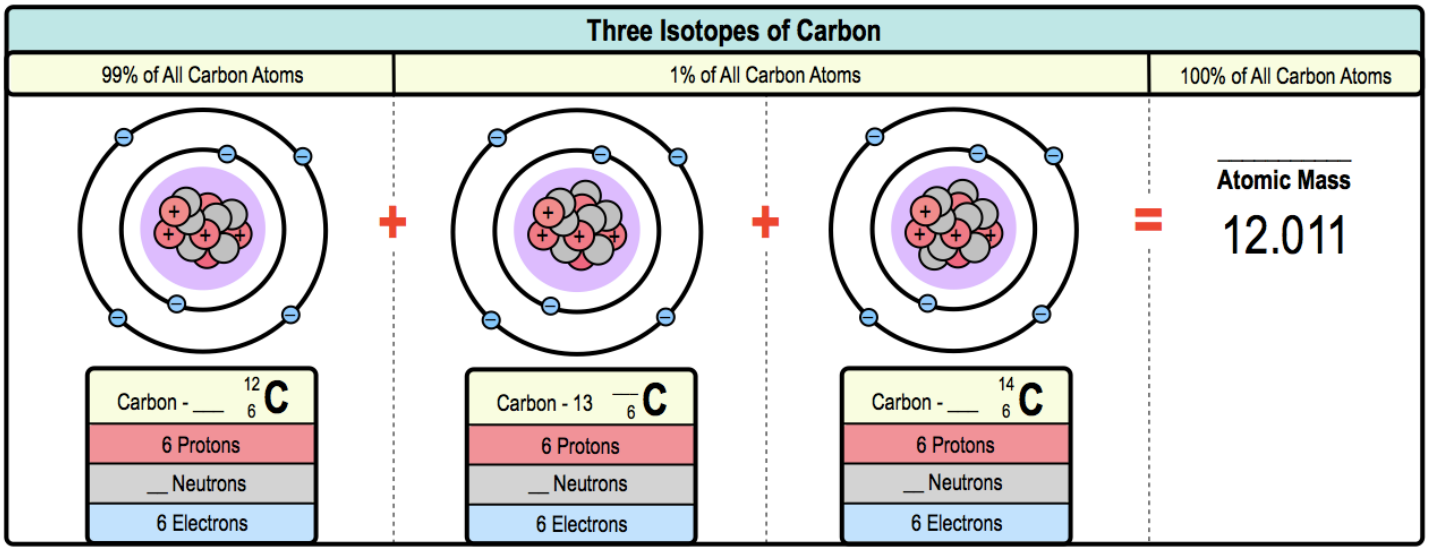
CONCEPT: ISOTOPES

●All atoms of an element have the *same* # of protons, but NOT necessarily the same number of *neutrons*.

- □ _____: atoms of the same element that only vary in the number of _____.
- □ _____ *atomic numbers* (# of protons) BUT _____ *mass numbers* (# of protons + neutrons).
- □ Recall: *Atomic Mass* is the *average* mass of all isotopes.

EXAMPLE: Atomic Mass of Carbons 3 Isotopes.



PRACTICE: What is TRUE about carbon-13 and carbon-14?

a) They are isotopes.
b) They have the same mass number.
c) They have the same number of neutrons in their nuclei.
d) They behave differently in biological reactions.
e) None of the above are true.

PRACTICE: How are Carbon-13 and Nitrogen-15 respectively different from the more abundant isotopes Carbon-12 and Nitrogen-14? Carbon-13 and Nitrogen-15 _____:

a) Each have an extra neutron. b) Each have an extra proton. c) Each have one less neutron.
d) Each have one less proton. e) Each have one less electron.

CONCEPT: ISOTOPES

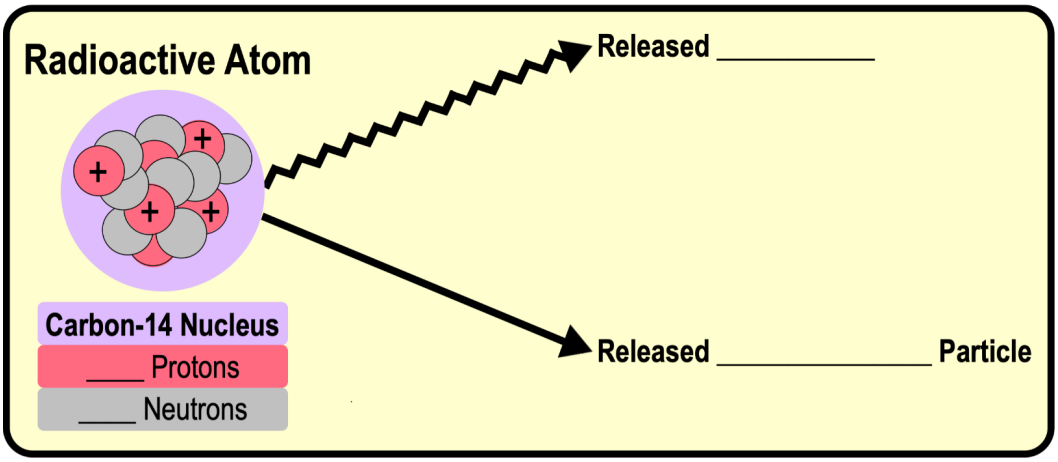
PRACTICE: The atomic number of nitrogen is 7. Nitrogen-15 has a greater mass number than nitrogen-14 because the atomic nucleus of nitrogen-15 contains _____.

a) 7 neutrons. b) 8 neutrons. c) 8 protons. d) 15 protons.

Radioactive Isotopes

- _____ *Isotopes*: unstable isotopes that break down & emit energy in the form of rays or particles.
  - □ *Half-life:* time it takes for _____ of all radioactive atoms in a sample to break down.
  - □ Radioactive isotopes are used in *medicine* & *radiometric dating of fossils.*

EXAMPLE: Radioactivity of Carbon-14.



PRACTICE: Radioactive isotopes are utilized for all of the following *except*:

a) Dating fossilized material of once living things.
b) Radiation treatment to slow or stop the development of cancer cells.
c) Labeling regions of the body with radioactivity for special imaging techniques.
d) All of the above.

PRACTICE: The isotope Carbon-14 has a half-life of 5,730 years. How many years must pass for a sample of Carbon-14 to break down to ¼ of its original amount?

a) 5,730 years b) 17,190 c) 11,460 d) 2,865