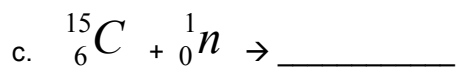
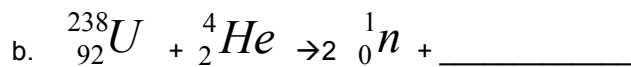
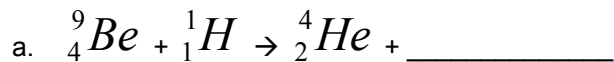




3. Complete the following transmutation equations:



4. Sodium-24 has a half-life of 15 hours. How much sodium-24 will remain in an 18.0 g sample after 60 hours?

5. After 42 days, a 2.0 g sample of phosphorus-32 contains only 0.25 grams of isotope. What is the half life of phosphorus-32?

Classify each of these statements as always true, AT; sometimes true, ST, or never true, NT.

6.  Beta radiation is emitted when a radioisotope decays.
7.  Gamma radiation has a negative charge.
8.  If you start with 100 grams of a radioisotope, after 10 half-lives, there will be none of the radioisotope left.
9.  Gamma radiation and Xrays are high energy electromagnetic radiation.
10.   ${}^{238}_{92}\text{U} + {}^0_{-1}\text{e} \rightarrow {}^{239}_{92}\text{U}$
11.  A radioisotope has a half-life of 12 minutes. After 36 minutes, only one-third of the radioactive atoms initially present will remain.
12.  In nuclear fusion, the nuclei of two large atoms fuse together.
13.  When a beta particle is emitted, the atomic number increases by 1, and the mass number stays the same.
14.  When a radioactive nucleus emits a beta particle, its atomic number decreases by 4 and its mass number decreases by 2.
15.  When a gamma ray is emitted, atomic mass and atomic number increase.
16.  In his periodic table, Mendeleev arranged the elements in ascending order of atomic number.
17.  The transition elements are in groups 1 and 2.
18.  Chlorine has the electron configuration  $1s^2 2s^2 2p^6 3s^2 3p^7$ .
19.  The element in group 13, period 4 is gallium.
20.  The radius of an atom cannot be measured directly.
21.  Removing one electron from an atom results in the formation of a positive ion with a +1 charge.
22.  Positive ions are always larger than the neutral atoms from which they form.
23.  Electronegativities increase as you go down a group.

24. Draw Lewis structures for:

Ge

S

Br

Ca

Rb

Kr

**Periodicity problems for you to try:**

**Atomic Radius**

25. Order the following atoms in order of increasing atomic radius

Na, K, Be, Mg      \_\_\_\_\_ < \_\_\_\_\_ < \_\_\_\_\_ < \_\_\_\_\_

N, P, O, Ga      \_\_\_\_\_ < \_\_\_\_\_ < \_\_\_\_\_ < \_\_\_\_\_

**Ionic Charge**

25. Use orbital notation to write the electron configurations of neutral Sr and Sr<sup>2+</sup> ion

a. Sr

b. Sr<sup>2+</sup>

c. Why is the 2+ ion the one that typically tends to form?

d. Which has a larger atomic radius, Sr, or Sr<sup>2+</sup>? Why? Use shielding and/or  $Z_{\text{eff}}$  in your answer

26. Write the electron configuration (using orbital notation) of neutral O and of the O<sup>2-</sup> ion.

a. O

b. O<sup>2-</sup>

e. Which has a larger radius, O or O<sup>2-</sup>? Why? Use shielding and/or  $Z_{\text{eff}}$  in your answer

27. Circle all of the ions below that do **not** have noble gas stability.

K<sup>+</sup>                  S<sup>2-</sup>                  Mg<sup>+</sup>                  I<sup>-</sup>                  Al<sup>3+</sup>                  Sc<sup>2+</sup>

28. What are the typical ions of:

Ga                  Cl                  Ba                  Si                  N

