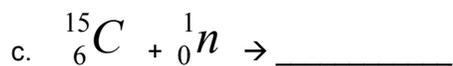
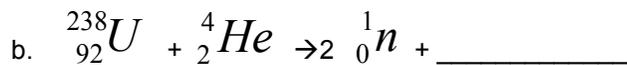
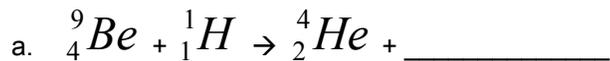




3. Complete the following transmutation equations:



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

