Name: _____ Date: _____ Hour: _____

Topic: Nuclear Chemistry (Unit 4)

Nuclear Chemistry Guided Practice

Instructions- Answer the following questions. Make sure to show all appropriate work to justify your answer. Answer questions with complete sentences.

1. What are nucleons and nuclides? Give an example of the two ways to write a nuc ide.

2. Using the graph on page 683 in your textbook, explain the relationship of the neutron to proton ratio as the atomic number increases.

3. Describe the three particles, which can be emitted during radioactive decay, in terms of mass number, atomic number, energy, charge, symbol and how it can be shielded.

4. What is meant by radioactive? Why are certain substances radioactive while others are not?

5. Determine the number of protons and neutrons located in the nucleus of each atom.
   a. $^{243}_{95}Am$
   b. $^{60}_{27}Co$
   c. $^{247}_{97}Bk$
   d. $^{223}_{87}Fr$
   e. Californium- 251
   f. Cerium- 144
   g. Actinium- 228
   h. Potassium-40

6. Complete the equations (Mass numbers and Atomic Numbers must be equal on both sides of the equation)
   a. $^{14}_{6}C \rightarrow {}^{-1}e + ?$
   b. $^{241}_{95}Am \rightarrow He + ?$
   c. $^{16}_{7}N \rightarrow {}^{16}_{8}O + ?$

7. Write a nuclear equation for the following radioactive processes.

a. Alpha decay of francium-208

b. Beta Emission by beryllium-7

c. Beta emission by argon-37

d. Alpha Decay by Uranium-238

8. Polonium-214 has a short half-life of 164 seconds. How many seconds will it take for 8.0 grams of this isotope to decay to 0.25 grams?

9. How many days will it take for 16.0 grams of palladium-103 to decay to 1.0 grams, if the half-life of palladium-103 is 17 days?

10. In 5.50 seconds, 1.20 grams of aregon-35 decay to leave only 0.15 grams. What is the half-life of argon-35?

11. What are the differences between fusion energy and fission energy? Make sure to include in your answer how the reactions differ.