**Chapter 25 Quiz Review**

1. What is the definition of a radioactive substance? What about this substance makes it radioactive?
2. What are the names of the two nuclear processes that both release a great deal of energy? Explain the differences between the two of them.
3. How are radioactive substances used in medicine, and why is it important to use substances that have short half lives?
4. How is half-life defined? How would you be able to determine how much of your original sample remains after 5 half lives?
5. What are the three major forms of radiation that are given off? List one property about each of them.
6. What are the four major forms of radioactive decay, including what is released for each one of them?
7. Write the correct notation for Uranium-238. Include what each number represents.
8. Show Uranium-238 undergoing:
   1. Alpha Decay
   2. Beta Decay
   3. Positron Emission
   4. Gamma Decay
9. You have Neptunium-240 and it undergoes an alpha decay, two beta decays, a gamma decay, another alpha decay, and a positron emission. What is your final product.
10. What form(s) of decay are necessary to go from Radon-224 to Mercury-212?
11. What are the two formulas used in half-life? What does each variable in each of the formulas represent?
12. You have 60 grams of Thorium-230. Calculate the half-life of the sample if after 4 hours 70% of the sample remains.
13. You have a 56 gram sample of radioactive Polonium-240. What is the half-life of this substance when 50 grams decays after only 2 hours?
14. If the half-life of uranium-235 is 7.04 × 108 years and 12.5 g of uranium-235 remain after 2.82 × 109 years, how much of the radioactive isotope was in the original sample?
15. . Carbon-14 has a half-life of 5730 years. How much of a 144 g sample of carbon-14 will remain after 1.719 × 104 years?
16. *How is the activity of a radioactive substance measured (units?) How do we derive this unit (what variable in our equations do we use and how do we get it into the correct units?)*
17. *The half-life of a phosphorus isotope is 14 days, if there are 3.0x1016 nuclei that undergo decay, determine its activity, in curies (Ci)? (1 day = 86400 sec)*
18. *If 30% of your original sample of Carbon-15 remains after 10 seconds, and the activity level was measured to be 0.36 curies, calculate how many nuclei underwent decay. How many grams of your sample is this?*
19. *You are given a 60 gram sample of sodium-24, with a half-life of 10 hours.*
    1. *Calculate how many nuclei are present after two half lives.*
    2. *Determine the rate constant*
    3. *Calculate the nuclear activity of 2 half-lives, in decays/sec. and in curies.*
    4. *Calculate how much of your sample decays after 1 day. What percentage is this?*