

## Ch. 22 Nuclear Chemistry Test Review

1. Write the isotope notation (2 ways to do this) for Uranium with both the mass # (use 239) and atomic number from the periodic table. Which number is on top, which one is on bottom?
2. Write the isotope notation (2 ways to do this) for lead with both the mass # (use 213) and atomic number from the periodic table.
3. Explain the meaning of the numbers in the following isotope notation:  ${}_{94}^{244}\text{Pu}$
4. When you write out an isotope in the form "Xenon-143," what does the 143 mean?
5. What do the variables in  $E=mc^2$  mean?
6. What is the symbol for an alpha, a beta and a gamma particle?
7. What are beta particles?
8. What is a gamma ray?
9. What is an Alpha particle?
10. Which of the above types of radiation is the most dangerous, AKA penetrates the most through materials?
11. Which radioactive particle is most massive?
12. Why do nuclear reactions occur?
13. What is the difference between fission and fusion?
14. Define radioactive decay.
15. Define half-life.
16. What is something you can use half-life for? (hint think Carbon 14)
17. What makes radioactive materials unstable?
18. What element is mostly likely to be used in fusion reactions to meet energy needs in a nuclear power plant?
19. Where does the heat in a nuclear reaction come from?

20. For this test, you can hand-write anything you think is helpful on a 3x5 notecard, which you can use on the test.
21. What isotope is commonly used for fission reactions?
22. Why is carbon-14 commonly used for radioactive dating?
23. A nuclear reactor in a nuclear power plant generates heat. What is that heat used for?
24. Be able to identify fission and fusion reactions.

**Problems:**

1. Write out and balance the alpha decay of Beryllium-9.
2. Write out and balance the beta decay of Uranium-192
3. The half-life of carbon is 5,715 years. How many milligrams of carbon-14 remain after 11,430 years if you start with 1000 mg?
4. The half-life of cobalt-60 is 10.47 min. How many milligrams of cobalt-60 remain after 41.88 min. if you start with 80 mg?
5. Balance the following:  ${}^{212}_{84}\text{Po} \rightarrow \text{_____} + {}^{208}_{82}\text{Pb}$  What type of decay?
6. Balance the following:  ${}^{37}_{18}\text{Ar} + \text{_____} \rightarrow {}^{37}_{17}\text{Cl}$  What type of decay?
7. Balance the following:  ${}^{226}_{88}\text{Rn} \rightarrow {}^{222}_{86}\text{Ra} + \text{_____}$  What type of decay?