

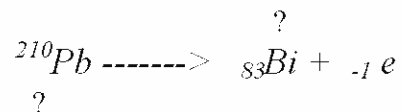
HALF- LIFE AND NUCLEAR DECAY PROBLEMS

Name _____

1.) Describe the 3 basic types of radiation. Describe the 3 types of nuclear decay. Give the symbols for each.

2.) An isotope of cesium (cesium-137) has a half- life of 30 years. If 1.0 mg of cesium-137 disintegrates over a period of 90 years, how many milligrams of cesium-137 would remain?

3.) An isotope of lead decays to an isotope of bismuth by the emission of a beta particle. Complete the equation below by supplying the missing atomic number of lead and the missing mass number of bismuth.



4.) The C-14 nucleus undergoes beta decay. What stable nucleus is formed? Show work

5.) A 2.5 gram sample of an isotope of strontium-90 was formed in a 1960 explosion of an atomic bomb at Johnson Island in the Pacific Test Site. In what year will only .625 grams of this strontium- 90 remain?

6.) Write the equation for the beta decay of Cu-66.

7.) Write the equation for the alpha decay of Pb- 204

8.) The half-life of isotope X is 2.0 years. How many years would it take for a 4.0 mg sample of X to decay and have only .50 mg of it remain?

9.) 3 grams of Bismuth -218 decay to .375 grams in one hour. What is the half-life of this isotope?

10.) If an atom of Uranium-238 undergoes alpha decay, what new element is created? What is the half-life of the new element? Show work/ equation.

11.) A fossil begins with 35 mg of Carbon-14. How much Carbon-14 will remain after 34,200 years?

12.) A metamorphic rock containing Potassium-40 was dated and found to be 650 million years old. How much Potassium-40 does the rock contain?

13.) ${}_{58}^{141}\text{Ce} \text{ -----} \rightarrow \text{_____} + \beta$

14.) N-13 has a half-life of ten minutes. If you start with 2 grams, how much remains after 40 minutes?

15.) A rock containing Uranium-235 is found in Greenland. By using radioactive dating, the age of the rock was estimated to be 3,565 million years old. How much Uranium- 235 was left in the rock?

COMMON ISOTOPES W/ HALF-LIFE

<u>ISOTOPE</u>	<u>HALF-LIFE</u>
Uranium-238	4.5 billion years
Radon-222	3.8 days
Barium-140	13 days
Plutonium-239	24,000 years
Plutonium-240	6,500 years
Cesium-137	30 years
Strontium-90	29 years
H-3 (Tritium)	12.4 years
Carbon-14	5,700 years
Cobalt-60	5.3 years
Potassium-40	1.3 billion years
Uranium-234	245,000 years
Thorium-234	24 days
Radium-226	1,600 years
Bismuth-210	5 days