

Nuclear Intro

1. Write the decay equation
 - a. Sodium 24 decays by positron emission
 - b. Plutonium-244 decays by alpha emission
 - c. Carbon-14 becomes Nitrogen-14
 - d. Boron-9 becomes Beryllium-9
 - e. Protactinium-231 decays by alpha then beta then positron then alpha. Show the decay series.
2. Calculate the energy per decay for 1a and 1c
3. Find the binding energy in MeV.
 - a. Lithium-7
 - b. O-15
 - c. O-16
4. Find the binding energy in MeV/nucleon.
 - a. ^{13}C
 - b. ^{14}C
 - c. ^{15}C
5. Half-life and radioactive decay.
 - a. If you have 0.02 g of Carbon-14, how long will it take for 0.001 g to remain?
 - b. Originally, a sample of ^{22}Na is 1.2×10^{13} atoms. How long until 3.4×10^{12} atoms of Na remain?
 - c. A scientist found 0.15g of a radioactive substance in his desk. 25 days later, the mass of the sample was 0.12 g. Find the half-life.
 - d. A student found a sample of radioactive Na-24 with a mass of $0.102 \mu\text{g}$. However, a tag on the sample indicates that the original mass was $0.724 \mu\text{g}$. How old is the sample?
 - e. ^{238}U eventually decays to Pb with a half-life of 4.5×10^9 years. A scientist found the ration of Pb to U-235 in a sample to be 1.25 to 4. Find the age of the sample.