

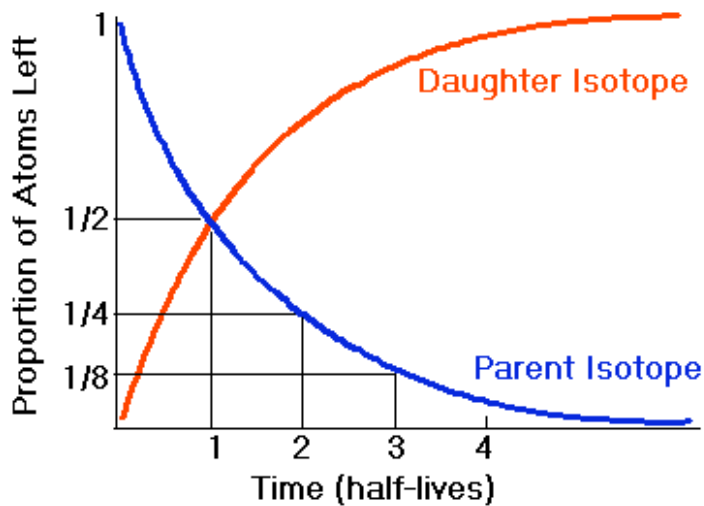
# Radiometric Dating Simulation

## Instructions and Introduction:

You will obtain a “fossil” in some stage of radioactive decay. (The bag itself represents the fossil and the beads inside represent some of the millions of atoms that make it up.) You will count the number of parent isotope atoms and the number of daughter isotope atoms. *The original number of parent isotope atoms (before any decay) should be equal to the total number of atoms in the bag.* You will then determine how many half-lives the isotope has gone through and therefore the age of the rock. Through this simulation, you will gain an understanding of how scientists are able to use isotopes such as U-235 and Pb-207 to determine the age of ancient minerals.

Fossil #	# of parent isotope atoms (radioactive atoms)	# of daughter isotope atoms (decayed atoms)	Number of original parent isotope atoms (all in the bag started radioactive)	Percent of parent atoms remaining in fossil (what percent is still radioactive?)*	Number of half-lives parent isotope has experienced in fossil	Age of fossil

\*\*# of parent isotopes / (# of original parent isotope atoms)



Parent Isotope	Half-Life	Daughter Isotope
U-235 (blue)	704 million years	Pb-207 (red)
U-238 (green)	4.5 billion years	Pb-206 (black)
Th-232 (yellow)	14 billion years	Pb-208 (red)
C-14 (yellow)	5730 years	N-14 (green)

## Follow-up Questions:

1. Rank the fossils from oldest to youngest.

2. It is generally accepted that after 9 half-lives, there is so little parent isotope left, that measuring is not feasible or accurate. What is the upper limit for dating using the following isotopes?

Parent Isotope	Half-Life	Daughter Isotope	Upper limit for dating
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C-14 (yellow)	5730 years	N-14 (green)	

3. Are any of the fossils you tested older than the limits above? Which fossil numbers?

4. Using your answer from #3 above, which radioactive isotope cannot be used to date this fossil?

5. If you wanted to date a sample that you estimated to be about 1 million years old, which isotope would you use to date it, Uranium 235 or Thorium 232? Why?

6. Which of the following substances would carbon-14 be most useful in dating?

Fossil wood, shell, bone, fabric, and ash between 10,000 and 70,000 years old

Granite rock more than 10 million years old

Potassium-bearing minerals more than 100,000 years old

7. As this is a simulation, what might be some difficulties in using radiometric dating to date real fossils? List at least three: