

Petrified Forest

For Kids!

At Home Activity



How old is that rock?

Most of the rocks and fossils within Petrified Forest are from the Late Triassic epoch and are over 200 million years old. Have you ever wondered how scientists come up with these ages? Relative dating can tell scientists if a rock layer, or fossil in a layer, is older or younger than another layer by their relative positions (older rocks are on the bottom and younger rocks are on the top). Determining absolute time however is a little more complicated. Measuring radioactive isotopes within the minerals of the rock is how scientists accomplish this.



Radioactive isotopes decay at even and continuous rates. The nuclei break down as the radioactive isotope changes to a stable non-radioactive isotope over time. The beginning isotope is called the 'parent' and the new isotope is called the 'daughter'. An isotope's half-life is the time it takes for half of the atoms of the parent isotope to change into atoms of the daughter isotope. For example if an isotope's half-life is 1000 years, it will take 1000 years for half the amount of that parent isotope to change into daughter isotopes. It will take another 1000 years for half of the remaining parent isotopes to change and so on. Very old rocks can be dated using potassium-40 or uranium-235 by measuring the ratio of parent to daughter isotopes contained in the minerals because their half-lives are already known. You can simulate this process with pennies in this fun at-home experiment.





What you need:

- 50 pennies (or 50 bite sized candy pieces with a letter on one side) representing a sample of rock with radioactive isotopes.
- One large paper or plastic cup
- One shoe-box or similar sized container
- Paper and pencil

Pennies heads up represent the parent isotope atoms and pennies tails up represent the daughter isotope atoms. If using candy; the blank side is the parent and the lettered side is the daughter. For this experiment your isotope's (penny's) half-life equals 100 years.

Procedure:

1. On your paper, create a chart like the one below.
 2. Put all the pennies in your cup, shake well, and then spill them out into the shoe-box.
 3. Take out all the pennies that are tails up and count how many you have left in the box. Write your count in your chart under 1 half-life.
 4. Repeat steps 2 & 3 until there are no pennies left in your box, writing down your results under the appropriate half-life number on your chart. By looking at your counts you can see the rate of decay of your isotope. By doing more than one trial and taking the averages you get a more accurate result.
 6. How many half-lives did it take for all your pennies to turn tails? Multiply your answer by the 100 year half-life to find out how many years it takes for the all the parent atoms to become the daughter atoms. If your rock sample has 13 parent atoms, how old is the rock?
 6. Repeat the whole experiment to see if you get the same results.
- By repeating the experiment many times and averaging your counts after each half-life you will get greater accuracy in results.

Your Data	Original #	1 Half-life	2 Half-lives	3 Half-lives	4 Half-lives	5 Half-lives	6 Half-lives
Trial #1	50						
Trial #2	50						
Trial #3	50						
Trial #4	50						
Trial #5	50						
Totals	250						
Averages (Totals divided by 5)	50						