

Carbon Dating Log Book

In your own words, tell me what carbon dating is.

Why do you think scientists use carbon dating when looking for the age of an object instead of just using relative location (for example, the bone was in a soil layer that was 3,000 years old)?

Play-Dough Experiment Observations

What was the length of your play-dough roll in the beginning?

_____ cm What fractions of the whole is this? _____

What was the length of your play-dough roll after cutting it in half?

_____ cm *This is one half-life of your remaining play-dough roll*

What fractions of the whole is this? _____

What is the length of your play-dough roll after cutting your piece in half again?

_____ cm *This is one half-life of your remaining play-dough roll*

What fractions of the whole is this? _____

What is the length of your play-dough roll after cutting your piece in half again?

_____ cm *This is one half-life of your remaining play-dough roll*

What fractions of the whole is this? _____

Now, let's look at an equation that shows you how to find the half-life of an object.

$$A = A_0 \cdot \left(\frac{1}{2}\right)^{\frac{t}{h}}$$

final amount \rightarrow A initial amount \rightarrow A_0 $\left(\frac{1}{2}\right)$ is the split factor... After a half-life, one pound becomes $\frac{1}{2}$ pound. t is time h is half-life

You can also write the equation $A = A_0 * 2^{-t/h}$ so choose either one to do your calculations.

An example of a problem we could use with this formula would be:

In 2014, you buried a dog bone with 20kg Carbon-14 in it. The half-life for Carbon-14 is 5,730 years. An archaeologist digs up your dog bone in the year 13,474 (11,460 years after you have buried it). How much of the Carbon-14 would be left?

The way that you would figure this out would be to say:

$$A_0 = 20\text{kg} \quad t = 11,460 \text{ years} \quad h = 5,730 \text{ years}$$

$$A = 20 * \left(\frac{1}{2}\right)^{11,460 / 5,730}$$

$$A = 5\text{kg}$$

This makes sense because 11,460 years is 2 half-lives (5,730 x 2). This means that after 5,730, there would be 10kg left, and after the second half life, 10 kg would be halved again-so you have $\frac{1}{4}$ of the original number.

Bonus – If we had 3 half-lives, how much of the original number would be left? (hint-what is half of $\frac{1}{4}$?)

Let's try another problem.

You find a piece of charcoal in the ground and find it has 10 kg of Carbon-14 left in it. You know that it has been buried for 11,460 years. Using the same half-life as before, can you figure out how much Carbon-14 the charcoal had before?
Remember, this time we know the final number, not the initial.

A =

T=

H=

Initial mass = _____ kg

This time, write your own word problem and have a friend solve it!
