

Infrared and Carbon Dating

NGSS:

5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen.

5-PS1-3. Make observations and measurements to identify materials based on their properties.

MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.

MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

MS-PS1-4. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

Common Core:

5-PS1-3. Make observations and measurements to identify materials based on their properties.

MP.4 Model with mathematics.

MP.5 Use appropriate tools strategically.

5.NF.B.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.

6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems.

6.SP.B.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

6.SP.B.5 Summarize numerical data sets in relation to their context.

7.RP.A.2 Recognize and represent proportional relationships between quantities.

Guiding Questions: How do scientists tell what an object is if they cannot identify it with qualitative physical observations? How can they tell how old the object is?

Word wall:

Carbon Dating – The process where you look at the amount of Carbon 14 left in an object to determine how old it is

Infrared Light – Light with wavelengths longer than visible light (so you cannot see them) but shorter than radio waves. These are the waves you use when you push a button on your remote control to change the channel.

Organic Material – Things that are living or once living. This can include things such as plants and animals.

Inorganic Material – Things that were never living. An example of something inorganic would be a rock or metal.

Procedure

Video 1 – How to identify unknown objects in the field with Bridgett

Video 2 – How does carbon dating work?

Write in lab journal telling reflection on the carbon dating video

Interactive Homework project (made for students in all grade levels)

Junior Archaeologist Assignment (made for students in middle school)

Interactive Homework

With one tube of play-dough, roll a “snake” 16 cm long. Measure your snake with a ruler and record your initial quantitative data in your lab journal. Next, cut your snake in half-make sure to use the ruler so you get an exact number! Measure the length of half of your snake and record the measurements in your lab journal, then put the other half aside. Cut your snake in half again and measure/record the length in your lab journal. Again, put one half to the side. Finally, cut your remaining snake in half a third time and measure/record its length. Make sure you record the fraction of the whole snake you have left every time you cut your piece in half.

Discuss, what did you notice about the length of the snake each time? How do the measurements relate to each other and were there any patterns with these numbers? How many half-lives did your snake go through? What was your initial length and what was the final length of the snake? What fraction of the whole snake length was your remaining piece?

Junior Archaeologist Assignment

Read the instructions of how to calculate half-life of Carbon-14 in an object. Work through the calculations to find the final mass of a dog bone and charcoal. After you have completed the calculations, graph the mass of each using a line graph to show the change over time.

When you are done, create your own story problem and challenge a friend or family member to solve it!