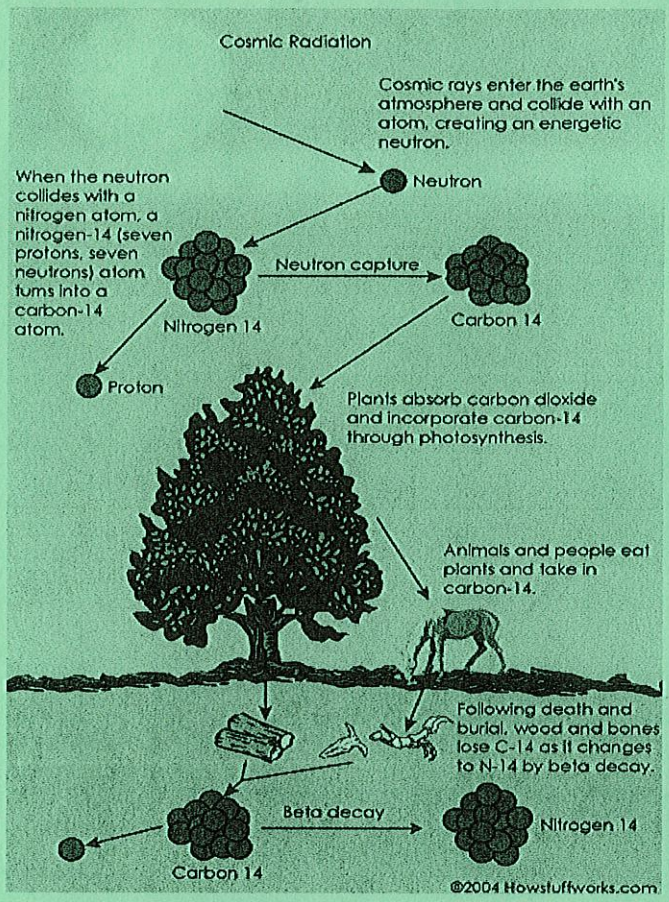
Station fossil dating

RADIOACTIVE DATING

Radiocarbon or **Carbon-14 dating** is a method that utilizes concepts of radioactive decay to determine dates of fossils. This method is used on organic materials such as wood and seeds that are believed to be around 60,000 years old. Carbon-14 dating is a way of determining the age of certain archeological artifacts of a biological origin up to about 60,000 years old. It is used in dating things such as bone, cloth, wood and plant fibers that were created in the relatively recent past by human activities.



The carbon-14 atoms that cosmic rays create combine with oxygen to form carbon dioxide, which plants absorb naturally and incorporate into plant fibers by photosynthesis. Animals and people eat plants and take in carbon-14 as well. The ratio of normal carbon (carbon-12) to carbon-14 in the air and in all living things at any given time is nearly constant. Maybe one in a trillion carbon atoms are carbon-14. The carbon-14 atoms are always decaying, but they are being replaced by new carbon-14 atoms at a constant rate.

As soon as a living organism dies, it stops taking in new carbon. The ratio of carbon-12 to carbon-14 at the moment of death is the same as every other living thing, but the carbon-14 decays and is not replaced. The carbon-14 decays with its half-life of 5,700 years, while the amount of carbon-12 remains constant in the sample. By looking at the ratio of carbon-12 to carbon-14 in the sample and comparing it to the ratio in a living organism, it is possible to determine the age of a formerly living thing fairly precisely.

Because the half-life of carbon-14 is 5,730 years, it is only reliable for dating objects up to about 70,000 years old. However, the principle of carbon-14 dating applies to other isotopes as well. Potassium-40 is another radioactive element naturally found in your body and has a half-life of 1.3 billion years. Other useful radioisotopes for radioactive dating include Uranium -238 (half-life = 4.5 billion years) and Rubidium-87 (half-life = 49 billion years). The use of various radioisotopes allows the dating of biological and geological samples with a high degree of accuracy. However, radioisotope dating may not work so well in the future. Anything that dies after the 1940s, when nuclear bombs, nuclear reactors and open-air nuclear tests started changing things, will be harder to date precisely.

What did you learn?

1. Carbon-14's half life is 5700 years, meaning that within approximately 62,000 years, the material will have no Carbon-14 left. Describe what other options scientists have to use for fossils that they know are older than 62,000 years old (RI 8.3 APPLICATION)
2. Will scientists be able to age materials dated from modern day using these methods? Why or why not? (RI 8.4)