

Carbon-14

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Carbon-14 Latest News

Martin Kamen and Samuel Ruben's discovery of the radioactive isotope carbon-14 in 1940 helped usher in a new era of dating artifacts from past civilizations.

About Carbon-14

- **Carbon** has three main **isotopes**: **carbon-12**, **carbon-13**, and **carbon-14**. The **first two are stable**.
- **Carbon-14** is a **radioactive isotope** of carbon.
- It is **created in the atmosphere** through the **bombardment of nitrogen by cosmic rays**.
- It has **six protons and eight neutrons** in its nucleus.
- **By contrast, most of the carbon** in our bodies and in the outside world, known as **carbon-12**, has **six protons and six neutrons**.
- Crucially, those **two extra neutrons make the nucleus** of a carbon-14 atom **unstable** so that it **decays radioactively into an atom of nitrogen**.
- It is **used in radiocarbon dating** to determine the age of organic substances by measuring its decay over time.

What is Radiocarbon Dating, or Carbon-14 Dating?

- It is a method that provides **objective age estimates for carbon-based materials** that **originated from living organisms**.
- It is based on the fact that **living organisms**—like trees, plants, people, and animals—**absorb carbon-14** into their tissue.
- **When they die**, the **carbon-14 starts to change into other atoms** over time.
- Carbon-14 has a **half-life of approximately 5,730 years** (i.e., half the amount of the isotope present at any instant will undergo spontaneous disintegration during the succeeding 5,730 years).
- Because **carbon-14 decays at this constant rate**, an **estimate of the date at which an organism died can be made by measuring the amount of its residual carbon-14**.
- The technique was **developed in the late 1940s** at the University of Chicago by a team led by chemistry professor **Willard Libby**, who would later **receive the Nobel Prize** for the work.
- It has proved to be a versatile technique of **dating archaeological specimens from 500 to 50,000 years old**.
- Over the years, carbon-14 dating has **also found applications in geology, hydrology, geophysics, atmospheric science, oceanography**, paleoclimatology, and even biomedicine.

Source: **LS**

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