

Americium (Am) - Student Datasheet

Element 95 | Actinide - radioactive synthetic element | Period 7 | f-block

Atomic number	95
Atomic mass	[243]
Electron configuration	[Rn] 5f7 7s2
Reference isotope	241Am
Density	~12 g/cm3 - RSC reference
Melting point	1449 K
Boiling point	2284 K
Structure	Double-hexagonal close-packed (DHCP) americium metal

Big idea

Americium's chemical identity and its radioactivity must be taught together but not confused. +3 chemistry concerns electrons; half-life and alpha decay depend on the isotope's nucleus.

Structure and evidence

Room-temperature alpha-amerium is double-hexagonal close-packed (DHCP). The viewer is a reviewed teaching cell for the ground-state metallic phase, not a handling model or a complete high-temperature phase diagram.

Five things to remember

- Atomic number 95 means every americium nucleus contains 95 protons.
- The neutral ground-state reference is [Rn] 5f7 7s2.
- Americium has no stable isotopes; 241Am and 243Am are important long-lived isotopes.
- Americium was first made in 1944 at the University of Chicago by Seaborg and colleagues.
- Americium applications are regulated radioactive-material contexts; Element Lookup stays educational and non-operational.

Evidence, uses and context

Evidence boundary

Atomic and isotope values are measured/evaluated reference data. Published density values differ among reference compilations; this page uses the RSC fact-box value and records that choice in the release research notes. The material viewer is a room-temperature teaching cell, while nuclear applications remain high-level and non-operational.

Where is it used?

Ionization smoke alarms - A tiny sealed ^{241}Am source ionizes air in a sensing chamber; smoke changes the electrical signal and triggers the alarm.

Scientific research - Americium supports actinide chemistry, spectroscopy, nuclear-data and materials research.

Specialized sources - Americium isotopes can serve as compact radiation sources in controlled scientific/industrial equipment.

Potential space-power studies - Long-lived americium isotopes have been evaluated for specialized radioisotope power concepts.

Discovery and history

1944 - Glenn Seaborg, Ralph James, Leon Morgan and Albert Ghiorso produced americium at the University of Chicago.

1945 - Seaborg revealed the existence of elements 95 and 96 publicly around the time their discovery was being announced.

Mid-20th century - ^{241}Am became useful as a compact alpha source in regulated devices and scientific applications.

Today - Americium remains important in smoke-alarm history, actinide chemistry, isotope science and specialized research.

Phase / temperature context

This learner track shows americium as a solid below the 1449 K reference melting point, liquid to about 2284 K and gas above. The room-temperature structure is shown separately; high-temperature solid-phase complexity is not expanded into invented precise boundaries here.

Safety / interpretation boundary

Americium is radioactive. This page stays conceptual and non-operational: it does not provide source dismantling, isotope separation, concentration, fabrication, criticality or other radioactive-material handling instructions.

Questions and review

Direct answer first; explanation follows from the same reviewed element record.

What is americium?

Americium is synthetic radioactive chemical element 95 in the actinide series.

What is americium used for?

Its best-known public use is the tiny sealed ^{241}Am source in many ionization smoke alarms; it also has specialized scientific uses.

Where is americium found?

It is not a mined commodity. Tiny natural traces may occur from nuclear processes, but usable americium is produced in controlled nuclear-material contexts.

What is americium's electron configuration?

The neutral ground-state reference is $[\text{Rn}] 5f^7 7s^2$.

Is americium radioactive?

Yes. Americium has no stable isotopes.

Is americium safe in a smoke alarm?

Commercial alarms use a tiny sealed source engineered and regulated for the device. Users should not dismantle the source and should follow local disposal guidance.

Quick review

What is americium's atomic number?

Answer: 95

Americium is element 95.

Which isotope is widely associated with ionization smoke alarms?

Answer: ^{241}Am

Tiny sealed ^{241}Am sources are used in many ionization alarms.

Does americium have stable isotopes?

Answer: No

All known americium isotopes are radioactive.

What is the neutral ground-state reference configuration?

Answer: $[\text{Rn}] 5f^7 7s^2$

NIST gives a $5f^7 7s^2$ ground-state reference.

Which statement is correct?

Answer: Americium chemistry and isotope decay are different layers of science

Electron chemistry and nuclear decay must be kept conceptually separate.

Sources

Royal Society of Chemistry - Americium: <https://periodic-table.rsc.org/element/95/americium>

NIST - Atomic Data for Americium: <https://physics.nist.gov/PhysRefData/Handbook/Tables/americiumtable1.htm>

Los Alamos National Laboratory - Americium: <https://periodic.lanl.gov/95.shtml>

WebElements - Americium crystal structure: https://www.webelements.com/americium/crystal_structure_pdb.html