

Cesium (Cs) - Student Datasheet

Element 55 · Alkali metal · source-reviewed learning reference

Cesium (also spelled caesium) is element 55, a very reactive alkali metal with one 6s valence electron. Its best-known scientific role is the ^{133}Cs hyperfine transition used to define the SI second.

Quick reference

Atomic number	55
Relative atomic mass	132.905
Electron configuration	$[\text{Xe}] 6s^1$
Period / group / block	6 / 1 / s
Ordinary state	Soft gold-coloured solid at 20 °C
Density	1.873 g/cm ³
Melting point	301.7 K
Boiling point	944 K
Oxidation states	+1
Electronegativity	0.79

Structure & orbitals

Cesium metal is represented by a BCC teaching cell. Its very low melting point is handled separately in the temperature explorer.

The 6s probability model is spherical and hydrogen-like. It illustrates quantum probability, not a literal electron path around the nucleus.

Phase behavior

At approximately standard pressure cesium is solid below about 301.7 K, liquid from there to about 944 K, then gaseous. Its melting point lies close to common warm-room temperatures.

Five things to remember

- Atomic number 55 means 55 protons.
- Neutral cesium ends in $6s^1$ and commonly forms Cs^+ .
- Cesium melts near 301.7 K, only a little above ordinary room temperature.
- The SI second is defined using a specific ^{133}Cs hyperfine transition frequency.
- ^{137}Cs is a radioactive isotope and should not be confused with stable ^{133}Cs .

Cesium: Real World & Signature Science

Big idea

Stable ^{133}Cs in atomic clocks and radioactive ^{137}Cs are different isotopes with very different contexts. The element page keeps timekeeping, ordinary chemistry and radioisotope questions separate.

Why this element is scientifically distinctive

Compare Cs with Cs^+ , rotate a ^{133}Cs teaching nucleus and BCC metal cell, inspect the 6s probability cloud, then explore low melting, pollucite resources, atomic clocks and the difference between ^{133}Cs and ^{137}Cs .

Atomic clocks	A specific hyperfine transition of ^{133}Cs defines the SI second: 9,192,631,770 cycles per second.
Specialty chemistry	Cesium compounds are used in selected catalysts, optical materials, vacuum devices and specialized fluids.
Pollucite resources	Cesium is associated especially with the rare mineral pollucite in evolved pegmatite systems.
Low-melting metal	Cesium melts at about 301.7 K, illustrating how weak metallic cohesion can accompany a large alkali-metal atom.
^{137}Cs distinction	Radioactive ^{137}Cs appears in monitoring and environmental/nuclear contexts; it is not the isotope used to define the second.

From rare cesium minerals to precision uses: a high-level path

1. Cesium is not mined as native metal; pollucite is the principal ore mineral in rare pegmatites.
2. Ore concentration and chemical conversion produce cesium compounds in specialized industrial facilities.
3. Metallic cesium is highly reactive and handled only in controlled systems; no preparation procedure is provided here.
4. High-value uses include precision frequency standards and specialty chemical/optical applications.

History checkpoints

1860	Robert Bunsen and Gustav Kirchhoff discovered cesium spectroscopically from distinctive blue lines.
1882	Carl Setterberg isolated metallic cesium by electrolysis.
1967	The SI second was redefined using the ^{133}Cs hyperfine transition.
Today	Cesium remains important in precision timekeeping and specialized chemical/physical applications.

Cesium: Isotopes, Questions & Evidence

Isotope context

¹³³Cs	Stable · essentially all natural cesium	Reference teaching nucleus: 55 protons, 78 neutrons; basis of the SI second definition.
¹³⁷Cs	Radioactive fission-product isotope	Important in monitoring/environmental contexts; not the clock isotope.
¹³⁴Cs	Radioactive isotope	Used in specialized tracer/monitoring contexts under controlled conditions.

Common questions

What is cesium's atomic number?

55. Every cesium nucleus contains 55 protons.

Is cesium a metal?

Yes. It is a very reactive Group 1 alkali metal.

Are cesium and caesium the same element?

Yes. "Cesium" is the US spelling; "caesium" is widely used internationally. Both refer to Cs, element 55.

How many valence electrons does cesium have?

One, from its 6s¹ outer configuration.

Quick self-check

Q: What is cesium's atomic number? | Answer: 55. Atomic number equals proton count.

Q: What is the common cesium ion? | Answer: Cs⁺. Cesium commonly loses its one 6s valence electron.

Q: Which isotope defines the SI second? | Answer: ¹³³Cs. Stable ¹³³Cs supplies the defining hyperfine transition.

Evidence & safety

Atomic/phase data are evaluated. The BCC material view is a conventional-cell teaching model. The atomic-clock frequency is an exact SI definition; resource geography is illustrative rather than exhaustive.

Metallic cesium reacts violently with water and air. Radioactive cesium-isotope contexts require regulated professional controls; this page gives no preparation, source-access or handling instructions.

Core sources

Royal Society of Chemistry - Caesium

<https://periodic-table.rsc.org/element/55/cesium>

BIPM - SI Brochure

<https://www.bipm.org/en/publications/si-brochure>

USGS - Cesium mineral commodity context

<https://www.usgs.gov/centers/national-minerals-information-center/cesium-statistics-and-information>