

Mercury (Hg) - Student Datasheet

Atomic number 80 - Group 12 metal - Group 12 - Period 6 - d-block

Mercury is element 80, the only metallic element that is liquid under ordinary room conditions. Its signature science combines relativistic electronic effects, a low melting point, dense liquid behavior and a critical distinction between elemental mercury and highly varied mercury compounds.

Quick reference

Atomic number	80
Relative atomic mass	200.592
Electron configuration	[Xe] 4f14 5d10 6s2
State at 20 C	Dense liquid metal at 20 deg C
Density	13.5336 g/cm3
Melting point	234.321 K
Boiling point	629.769 K
Common oxidation state	+1 (Hg22+) and +2
Electronegativity	2.00

Structure & orbitals

Mercury is liquid at room temperature. Below its freezing point, alpha-Hg adopts a rhombohedral structure; the viewer is a simplified low-temperature lattice schematic and not a claim that room-temperature mercury is crystalline.

The 6s and representative 5d models are isolated-atom probability distributions. Relativistic effects are especially important for mercury, so these nonrelativistic teaching shapes are not a complete explanation of liquid-metal behavior.

Temperature / phase context

At approximately standard pressure, mercury is solid below 234.321 K, liquid from 234.321 K to about 629.769 K, and gaseous above. The material viewer shows the low-temperature solid lattice, while the page clearly labels mercury as liquid at room temperature.

Five things to remember

- Atomic number 80 means every mercury nucleus contains 80 protons.
- Neutral mercury has the ground-state configuration [Xe] 4f14 5d10 6s2.
- Mercury is liquid at ordinary room temperature because its melting point is only 234.321 K.
- Below its freezing point, solid alpha-mercury is rhombohedral.
- Mercury toxicity depends strongly on chemical form and exposure pathway; elemental, inorganic and organic mercury species are not interchangeable.

Mercury: Real World & Signature Science

A silvery mercury droplet is visually memorable, but mercury's most important modern lesson is species and exposure: elemental Hg, inorganic Hg compounds and methylmercury behave differently.

Why this element matters

Liquid metal Mercury's low melting point made it useful historically in thermometers, barometers and switches, though many applications have shifted to safer alternatives.	Gold-mining pollution Mercury use in artisanal and small-scale gold mining can release mercury to air, soils and water; this is an environmental-health problem, not a use recommendation.
Environmental cycling Mercury can be transformed and transported through atmosphere, waters, sediments and food webs, including methylmercury bioaccumulation.	Lamps & legacy products Mercury has been used in discharge lamps and older instruments; collection and disposal are regulated in many jurisdictions.
Global controls The Minamata Convention addresses anthropogenic mercury emissions, releases, products and processes at an international level.	

Mercury's material cycle: high-level environmental context

1. Mercury occurs in ores such as cinnabar and can also be released as a by-product or impurity from other industrial activities.
2. Historically, roasting mercury ores produced mercury vapor for condensation; this guide intentionally does not provide operational extraction instructions.
3. Mercury-containing products and industrial uses increasingly face substitution, collection and emission-control requirements.
4. Environmental management focuses on preventing releases and limiting conversion to forms such as methylmercury that bioaccumulate in food webs.

Where on Earth?

Mercury mining history - Selected heritage locations

Almaden and Idrija are historically important cinnabar/mercury mining districts; they are history pins, not current-use recommendations

Environmental mercury cycle - Global conceptual

Mercury moves among air, water, sediments and food webs, and chemical transformation changes exposure behavior

Global mercury controls - Minamata Convention

International controls address major mercury products, processes, emissions and releases

History

Ancient world - Cinnabar and mercury were known in antiquity and used in pigments, metallurgy and medicine despite hazards.

1643 - Torricelli's mercury barometer became a classic demonstration of atmospheric pressure.

19th-20th centuries - Mercury became common in instruments, switches, lamps and industrial chemistry.

21st century - Recognition of global pollution and health impacts drove substitution, tighter controls and the Minamata Convention on Mercury.

Uses

Legacy instruments Mercury's liquid range and density supported thermometers, barometers and switches, but safer replacements are now common.	Discharge lighting Mercury vapor has been used in fluorescent and other discharge lamps, creating a need for controlled end-of-life handling.
Specialized scientific uses Some reference electrodes and specialized equipment still use mercury under controlled laboratory conditions.	Historical amalgamation Mercury has been used to recover gold; uncontrolled use creates severe health and environmental risks and is not endorsed here.

Mercury: Isotopes, Questions & Evidence

Isotopes

202Hg - Stable - most abundant natural isotope
Teaching nucleus contains 80 protons and 122 neutrons.

200Hg - Stable - major natural isotope
One of several stable mercury isotopes contributing to natural atomic weight.

199Hg and 201Hg - Stable - NMR-active isotopes
Important in isotope and spectroscopy studies.

Mercury isotope family - Seven stable natural isotopes
Natural mercury has a rich stable-isotope pattern used in geochemical tracing.

Common questions

Why is mercury liquid at room temperature?

Its metallic bonding is unusually weak for a heavy metal; relativistic stabilization of the 6s electrons is an important part of the explanation, together with the details of mercury's electronic structure.

What is mercury's element symbol?

Hg, from the Latin hydrargyrum.

What is mercury's atomic number?

80.

Where is mercury found naturally?

Mostly in compounds and trace occurrences, with cinnabar (HgS) the classic ore mineral; free elemental mercury is not the dominant natural form.

Are all mercury compounds equally hazardous?

No. Toxicity, transport and exposure differ among elemental mercury, inorganic compounds and organic forms such as methylmercury.

Who discovered mercury?

Mercury was known in antiquity, so it does not have a single modern discoverer.

Quick self-check

1. What is mercury's atomic number? Answer: 80
2. What is mercury's physical state near 20 deg C? Answer: Liquid metal
3. What is mercury's symbol? Answer: Hg
4. Which statement is scientifically best? Answer: Mercury toxicity depends on chemical form and exposure pathway
5. What structure does solid alpha-mercury adopt below freezing? Answer: Rhombohedral

Evidence & provenance

Atomic, phase and density values are measured/evaluated. The solid-structure viewer applies below mercury's freezing point and is explicitly not a room-temperature crystal. Environmental and health context is high-level and species-aware.

Core sources

Royal Society of Chemistry - Mercury	https://periodic-table.rsc.org/element/80/mercury
NIST - Atomic Data for Mercury	https://physics.nist.gov/PhysRefData/Handbook/Tables/mercurytable1.htm
Minamata Convention on Mercury	https://minamataconvention.org/
WHO - Mercury and health	https://www.who.int/news-room/fact-sheets/detail/mercury-and-health