

Dubnium (Db) - Student Datasheet

Element 105 · Synthetic superheavy Group 5 element · source-reviewed learning reference

Dubnium is element 105, a synthetic superheavy Group 5 element. Nuclear decay establishes its identity and atom-scale chemistry tests niobium/tantalum-like behavior, while its color, density, melting point and crystal structure remain unmeasured bulk properties.

Quick reference

Atomic number	105
Relative atomic mass	[268]
Electron configuration	[Rn] 5f ¹⁴ 6d ³ 7s ²
Period / group / block	7 / 5 / d
State context	Macroscopic bulk state not experimentally established
Density	Unknown
Melting / transition	Unknown
Boiling / gas reference	Unknown
Oxidation states	Atom-scale Group 5 chemistry; +5 supported in compound studies
Electronegativity	Unknown

Structure & orbitals

No macroscopic dubnium crystal has been measured. The material viewer remains an evidence panel and does not copy tantalum's BCC structure.

Representative 6d and 7s clouds are theoretical isolated-atom teaching forms. They are not measured bulk orbitals or a crystal-density map.

Phase behavior

No measured macroscopic dubnium phase boundaries exist. The temperature explorer therefore remains explicitly unknown rather than drawing solid/liquid/gas transitions.

Five things to remember

- Atomic number 105 means 105 protons.
- Dubnium is synthetic and every known isotope is radioactive.
- Atom-scale experiments probe Group 5-like chemical behavior.
- Bulk density, color, melting/boiling points and crystal structure are unknown.
- The name dubnium honors Dubna, a major center in the element's discovery history.

Dubnium: Real World & Signature Science

Element-specific science, uses and history

Big idea

Searches ask “What color is dubnium?” and “What state is dubnium?” The scientifically honest answer is that no macroscopic sample exists to measure an ordinary bulk appearance or phase diagram. A predicted metal-like character is not a photographed chunk of Db.

Why this element is scientifically distinctive

Explore Db across the teaching nucleus, isolated-atom orbitals, evidence-aware material structure and temperature/evidence views, then connect those models to uses, isotopes and source-backed context.

Nuclear identity	Dubnium isotopes are identified through production and decay chains in superheavy-element research.
Atom-scale chemistry	Rapid experiments test whether individual Db atoms behave like heavy Group 5 homologues.
Discovery history	Dubna and Berkeley experiments contributed to the discovery-priority history of element 105.
Naming	IUPAC adopted dubnium as part of the 1997 naming resolution for transfermium elements.
Unknown bulk world	No practical-use, commodity, color or conventional material property should be fabricated from periodic placement.

How dubnium knowledge is built: atom-at-a-time evidence

1. Specialized accelerator experiments can create extremely small numbers of superheavy atoms; operational synthesis parameters are excluded.
2. Decay chains establish nuclear identity and isotope behavior.
3. Rapid chemistry can test adsorption or solution behavior before decay.
4. Theory and periodic comparison interpret sparse evidence while bulk properties remain unknown.

History checkpoints

1960s-1970s	Research groups at Dubna and Berkeley reported experiments relevant to element 105.
1970s-1990s	Discovery priority and naming were part of the wider transfermium naming dispute.
1997	IUPAC adopted the name dubnium (Db).
Modern research	Atom-scale chemistry has probed Group 5 homolog behavior.

Dubnium: Isotopes, Questions & Evidence

Evidence status and learner self-check

Isotope context

²⁶⁸Db	Radioactive superheavy isotope	Reference teaching nucleus with 105 protons and 163 neutrons.
Other Db isotopes	Radioactive	Multiple synthetic isotopes are known, all short-lived on ordinary material timescales.
Dubnium isotope context	No stable isotopes	Every known dubnium isotope is radioactive and synthetic.

Common questions

What is dubnium?

Dubnium is synthetic element 105, placed in Group 5.

Is dubnium a metal?

It is classified as a Group 5 transition element and is expected to show metallic/Group 5 chemistry, but no macroscopic metal sample has been measured.

What is dubnium used for?

Fundamental nuclear and atom-scale chemical research only.

Who discovered dubnium?

Discovery history involves competing Dubna and Berkeley experiments; IUPAC later resolved naming and credit issues.

Quick self-check

Q: What is dubnium's atomic number? | Answer: 105. Atomic number equals proton count.

Q: What is its measured bulk color? | Answer: Unknown. No macroscopic sample exists.

Q: What is its bulk melting point? | Answer: Unknown. No macroscopic melting measurement exists.

Evidence & safety

Nuclear identity/decay are experimental. Atom-scale Group 5 chemistry is experimentally constrained. Macroscopic appearance, density, phase boundaries and crystal structure remain unknown and are not replaced by theoretical guesses.

Dubnium exists only in specialized superheavy-element research. No beam settings, target preparation, synthesis, separation or handling procedures are provided.

Core sources

Royal Society of Chemistry - Dubnium

<https://periodic-table.rsc.org/element/105/dubnium>

IUPAC - Transfermium element naming resources

<https://iupac.org/what-we-do/periodic-table-of-elements/>