

# Flerovium (Fl)

Flerovium is a synthetic superheavy element observed atom by atom. Identity and nuclear decay are experimental; many ordinary bulk properties cannot be measured because macroscopic samples do not exist.

|               |           |                                     |
|---------------|-----------|-------------------------------------|
| <b>114</b>    | <b>Fl</b> | <b>[289]</b>                        |
| Atomic number | Flerovium | Relative atomic mass / mass display |

## 1. Quick facts

| Property               | Value                                                                  | Meaning for a student              |
|------------------------|------------------------------------------------------------------------|------------------------------------|
| Atomic number          | 114                                                                    | 114 protons                        |
| Electrons              | 114                                                                    | neutral-atom model                 |
| Electron configuration | [Rn] 5f <sup>14</sup> 6d <sup>10</sup> 7s <sup>2</sup> 7p <sup>2</sup> | RSC reference configuration        |
| Mass display           | [289]                                                                  | representative isotope mass number |
| Key isotope            | Fl-289                                                                 | short-lived synthetic isotope      |
| Group / period         | 14 / 7                                                                 | p-block                            |

## 2. Atomic structure and electron configuration

| Atomic feature   | Value                 | How to read it                                  |
|------------------|-----------------------|-------------------------------------------------|
| Element identity | Observed / validated  | Nuclei with Z = 114 have been produced.         |
| Key isotope      | Fl-289                | One useful reference isotope.                   |
| Bulk crystal     | Unknown               | No macroscopic sample for diffraction.          |
| Bulk state       | Not directly measured | Predictions must remain labeled as predictions. |

## 3. Signature idea

### Why are Flerovium bulk properties still unknown?

Experiments create only tiny numbers of very short-lived atoms. That is enough to establish nuclear identity and probe selected atom-at-a-time chemistry, but not enough to measure ordinary bulk density, melting point or a crystal lattice.

### Why is Flerovium not simply heavier lead?

Strong relativistic effects change high-Z electronic structure. Sparse single-atom adsorption experiments suggest unusually volatile, weakly reactive metallic behavior, so simple Group 14 extrapolation must be tested rather than assumed.

## 4. Properties, phase behavior and evidence

| Property                   | Value   | Meaning for a student        |
|----------------------------|---------|------------------------------|
| Measured density           | Unknown | No macroscopic sample.       |
| Measured melting point     | Unknown | No direct bulk measurement.  |
| Measured boiling point     | Unknown | No direct bulk measurement.  |
| Measured crystal structure | Unknown | No diffraction-scale sample. |

### Evidence context

Use values with their stated definitions, conditions and evidence status. Phase-transition temperatures describe a chosen pressure path; predicted or unknown properties are never presented as direct measurements.

## 5. Where on Earth?

### Flerovium has no natural deposit map

Flerovium is synthesized in nuclear-reaction experiments. Country/location context describes research laboratories and discovery history, not natural abundance, mining or reserves.

### Geography rule

The full interactive guide distinguishes natural occurrence from modern production, reserves or research locations. A map layer is labeled by what it actually represents.

## 6. Representative compounds / forms

| Single atoms       | Experimental scale | Chemistry is        |
|--------------------|--------------------|---------------------|
| Adsorption on gold | Experimental probe | Surface interaction |

## 7. Isotope snapshot

| Isotope           | Nucleus       | Natural abundance / status                               |
|-------------------|---------------|----------------------------------------------------------|
| Fl-289            | 114 p / 175 n | about 2.1 +/- 0.6 s; alpha decay dominant                |
| Other Fl isotopes | Z = 114       | Several short-lived isotopes are known from decay chains |

## 8. Questions to ask next

Why are Flerovium bulk properties unknown? Atom-at-a-time production prevents ordinary macroscopic measurements.

Why is Flerovium not simply a heavier lead? Relativistic effects and sparse experiments complicate simple Group 14 extrapolation.

## Sources

Royal Society of Chemistry - Flerovium element data

IUPAC - element 114 discovery/naming archive

PubChem / AMDC-IAEA compiled isotope data

Yakushev et al. - single-atom Flerovium adsorption/reactivity studies

Full interactive guide: <https://elementlookup.com/flerovium/>