

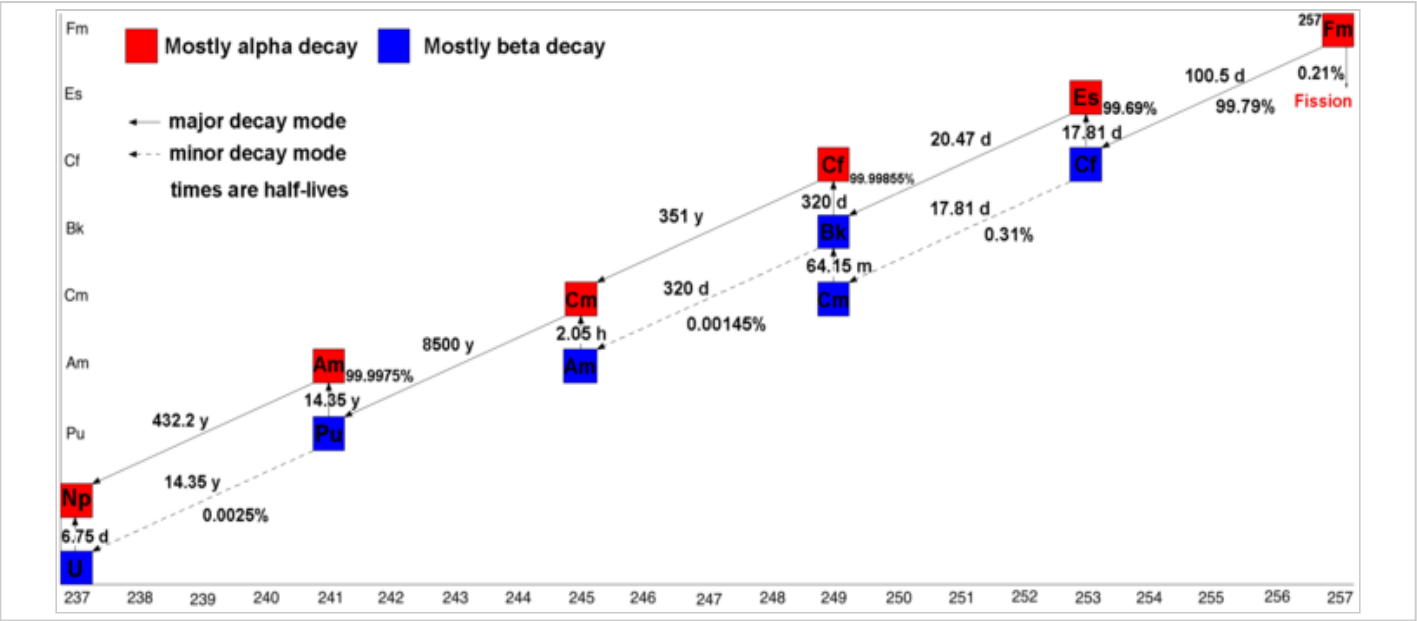
# Fermium

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**Fermium** is a synthetic element with symbol **Fm** and atomic number 100. It is a member of the actinide series. It is the heaviest element that can be formed by neutron bombardment of lighter elements, and hence the last element that can be prepared in macroscopic quantities, although pure fermium metal has not yet been prepared.<sup>[2]</sup> A total of 19 isotopes are known, with <sup>257</sup>Fm being the longest-lived with a half-life of 100.5 days.

It was discovered in the debris of the first hydrogen bomb explosion in 1952, and named after Enrico Fermi, one of the pioneers of nuclear physics. Its chemistry is typical for the late actinides, with a preponderance of the +3 oxidation state but also an accessible +2 oxidation state. Owing to the small amounts of produced fermium and all of its isotopes having relatively short half-lives, there are currently no uses for it outside of basic scientific research.

## Isotopes



### Fermium, <sup>100</sup>Fm

#### General properties

**Name, symbol** fermium, Fm

#### Fermium in the periodic table

**Atomic number (Z)** 100

**Group, block** group n/a, f-block

**Period** period 7

**Element category** ☐ actinide

**Standard atomic weight (*A*<sub>r</sub>)** (257)

**Electron configuration** [Rn] 5f<sup>12</sup> 7s<sup>2</sup>  
per shell 2, 8, 18, 32, 30, 8, 2

#### Physical properties

**Phase** solid (*predicted*)

**Melting point** 1800 K (1527 °C, 2781 °F) (*predicted*)

**Density** near r.t. 9.7(1) g/cm<sup>3</sup> (*predicted*)<sup>[1]</sup>

#### Atomic properties

**Oxidation states** 2, 3

**Electronegativity** Pauling scale: 1.3

**Ionization energies** 1st: 627 kJ/mol (estimated)

There are 19 isotopes of fermium listed in NUBASE 2003,<sup>[11]</sup> with atomic weights of 242 to 260,<sup>[Note 1]</sup> of which <sup>257</sup>Fm is the longest-lived with a half-life of 100.5 days. <sup>253</sup>Fm has a half-life of 3 days, while <sup>251</sup>Fm of 5.3 h, <sup>252</sup>Fm of 25.4 h, <sup>254</sup>Fm of 3.2 h, <sup>255</sup>Fm of 20.1 h, and <sup>256</sup>Fm of 2.6 hours. All the remaining ones have half-lives ranging from 30 minutes to less than a millisecond.<sup>[11]</sup> The neutron-capture product of fermium-257, <sup>258</sup>Fm, undergoes spontaneous fission with a half-life of just 370(14) microseconds; <sup>259</sup>Fm and <sup>260</sup>Fm are also unstable with respect to spontaneous fission (*t*<sub>1/2</sub> = 1.5(3) s and 4 ms respectively).<sup>[11]</sup> This means that neutron capture cannot be used to create nuclides with a mass number greater than 257, unless carried out in a nuclear explosion. As <sup>257</sup>Fm is an α-emitter, decaying to <sup>253</sup>Cf, and no fermium isotopes undergo beta minus decay (which would produce isotopes of the next element, mendelevium), fermium is also the last element that can be prepared by a neutron-capture process.<sup>[2][12][13]</sup>


## Source

- Wikipedia: Fermium (<https://en.wikipedia.org/wiki/Fermium>)

Miscellanea

Crystal structure

face-centered cubic (fcc)



(predicted)<sup>[11]</sup>

CAS Number

7440-72-4

History

Naming

after Enrico Fermi

Discovery

Lawrence Berkeley National Laboratory (1952)

Most stable isotopes of fermium

iso	NA	half-life	DM	DE (MeV)	DP
<sup>252</sup> Fm	syn	25.39 h	SF	–	–
			α	7.153	<sup>248</sup> Cf
<sup>253</sup> Fm	syn	3 d	ε	0.333	<sup>253</sup> Es
			α	7.197	<sup>249</sup> Cf
<sup>255</sup> Fm	syn	20.07 h	SF	–	–
			α	7.241	<sup>251</sup> Cf
<sup>257</sup> Fm	syn	100.5 d	α	6.864	<sup>253</sup> Cf
			SF	–	–