



LINDA ABLITT

ASTATINE

Element Symbol: **At**

Atomic Number: **85**

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Astatine is a highly radioactive chemical element. It is chemically similar to the other halogens above it in Group 17 of the periodic table. It is the heaviest known halogen. As chemists would expect, Astatine acts more like a metal than iodine, the element just above it in the table.

Astatine is produced by radioactive decay in nature, but due to its short half-life it is found only in minute amounts. It is currently the rarest naturally occurring element, with less than 30 grams estimated to be contained in the entire Earth's crust. This amounts to less than one teaspoon of the element. Isaac Asimov in a 1957 essay on large numbers, scientific notation and the size of the atom, wrote that in "all of North and South America to a depth of ten miles", the number of astatine-215 atoms at any time is "only a trillion". Guinness Book of Records lists it as the rarest element. It is found near thorium and uranium in the Earth's crust.

Astatine would be expected to be a nearly black solid, which, when heated, sublimates into a dark, purplish vapor (darker than iodine)

Astatine (after Greek *astatos* meaning unstable) was first synthesized in 1940 by Dale R Corson, Kenneth Ross MacKenzie and Emilio Segrè at the University of California, Berkeley by bombarding bismuth with alpha particles in a cyclotron. It took three years before actual astatine was found as product of the natural decay processes by the two scientists Berta Karlik and Traude Bernert.

Astatine has 33 known isotopes, all of which are radioactive, the range of their mass numbers is from 191 to 223. The longest-lived isotope is 210, which has a half-life of 8.1 hours; the shortest-lived known isotope is 213, which has a half-life of 125 nanoseconds.

The least stable isotopes of astatine have no practical applications other than scientific study due to their extremely short life, but heavier isotopes have medical uses. Astatine 211 can be used in radiation therapy. Several groups of scientists believe that Astatine 211 could be used to treat certain types of cancer. There has been a small but very promising clinical trial at Duke University in North Carolina, testing Astatine radiotherapy in 18 brain tumour patients.

Provided by the element sponsor Australian Science Teachers Association

ARTISTS DESCRIPTION

As Astatine had no current uses due to its rarity and short half life, I decided to focus on its composition. The first thing I noticed was its radioactivity, and so I have used the radioactive sign as the background of this print.

This has been overlaid with a stylized diagram of the astatine electron shell. This has been completed as a silk screen print.

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