

# Samarium Encyclopedia Article

## Samarium

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# Samarium

Samarium is a rare earth element, one of the elements that occupy the space in Row 6 of the **periodic table** between **lanthanum** (atomic number 57) and **hafnium** (atomic number 72). Samarium's **atomic number** is 62, its atomic **mass** is 150.4, and its chemical symbol is Sm.

## Properties

Samarium is a yellowish metal with a melting point of 1,962°F (1,072°C), a **boiling point** of 3,450°F (1,900°C), and a **density** of 7.53 grams per cubic centimeter. It is the hardest and most brittle of the **rare earth elements**.

Samarium is a fairly reactive metal that reacts with **water**, **oxygen**, acids, the **halogens**, and some other elements. It ignites in pure oxygen at a **temperature** of about 300°F (150°C).

## Occurrence and Extraction

Samarium is a moderately abundant element. It is estimated to occur at about 4.5-7 parts per million in the Earth's crust. It is found in the minerals samarskite, cerite, orthite, ytterbite, and fluorspar. It can be produced by heating samarium **oxide** ( $\text{Sm}_2\text{O}_3$ ) with **barium** or lanthanum metal:  $2\text{Ba} + \text{Sm}_2\text{O}_3 \rightarrow \text{Ba}_2\text{O}_3 + 2\text{Sm}$ .

## Discovery and Naming

Samarium was one of seven new elements found in an unusual mineral originally discovered near the town of Bastnas, Sweden, in the 1830s. The new element was "discovered" at least three times in the period 1879-80 by the French chemists Jean-Charles Galissard de Marignac (1817-1894), Paul-Émile Lecoq de Boisbaudran, and Eugène-Anatole Demarçay (1852-1904), all working independently. Credit for the discovery of samarium is often given to all three men. The element's name was taken from a mineral in which it occurs, samarskite which, in turn, was named after a Russian mine official, Colonel Samarski.

## Uses

Like other rare earth elements, samarium is used to add **color** or special optical properties to **glass**. It is also used to make **lasers** and very strong electromagnets. One of the strongest magnets available is made from an **alloy** of samarium and **cobalt**. Samarium-cobalt (SmCo) magnets retain their magnetic properties at high temperatures and are not very reactive. They are used in certain types of airplane motors.