

# Dysprosium Encyclopedia Article

## Dysprosium

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# Dysprosium

Dysprosium is one of 15 **rare earth elements**, a family also known as the lanthanides. The lanthanides make up the elements between **barium** and **hafnium** in Row 6 of the **periodic table**. Dysprosium's **atomic number** is 66, its atomic **mass** is 162.50, and its chemical symbol is Dy.

## Properties

Dysprosium is a soft metal with a shiny **silver** luster. It is so soft that it can easily be cut with a knife. The element has a melting point of 2,565°F (1,407°C), a **boiling point** of about 4,200°F (about 2,300°C), and a **density** of 8.54 grams per cubic centimeter. Dysprosium is relatively unreactive at room temperatures, but does react with both dilute and concentrated acids.

## Occurrence and Extraction

The term rare earth elements is a misnomer, since the elements that belong to this family are not particularly rare. The name was originally used for these elements because they were so difficult to separate from each other. Dysprosium, as an example, is actually more common in the Earth's crust than some better known elements, such as **bromine, tin, and arsenic**. It has an abundance of about 8.5 parts per million. It is extracted from ores by being converted first to dysprosium trifluoride ( $\text{DyF}_3$ ) and then reacted with **calcium** metal:  $2\text{DyF}_3 + 3\text{Ca} \rightarrow 3\text{CaF}_2 + 2\text{Dy}$ .

## Discovery and Naming

Dysprosium was proved to be an element in 1886 by the French chemist Paul-Émile Lecoq de Boisbaudran. The research that led to Boisbaudran's discovery involves a long and complex story of efforts to analyze a rock known as ytterite first discovered in 1787 by a Swedish army officer, Carl Axel Arrhenius (1757-1824). Ytterite was eventually to yield eight other new elements in addition to dysprosium. The element's name is taken from the Greek word *dysprositos*, meaning "difficult to obtain."

## Uses

Dysprosium has a relatively limited number of uses, most of them involving specialized alloys. For example, some dysprosium alloys have very good magnetic properties that make them suitable for use in CD players. Dysprosium alloys are also used in control rods used to moderate the flow of neutrons through a nuclear reactor.