

*** Name Origin:**

Latin: alumen (alum)

*** Sources:**

Most plentiful metal in earth's crust (8%), but never occurs in free form. Obtained by electrolysis from bauxite (Al_2O_3).

*** Uses:**

Kitchen utensils, building decorations, electrical transmission (not nearly as conductive as copper, but cheaper). Alloys containing copper, magnesium, silicon, manganese and other metals are much stronger and more durable than aluminum, making aluminum useful in the manufacture of aircraft and rockets.

*** Additional Notes:**

The ancient Greeks and Romans used alum in medicine as an astringent, and as a mordant in dyeing. In 1761 de Morveau proposed the name alumine for the base in alum, and Lavoisier, in 1787, thought this to be the oxide of a still undiscovered metal. Wohler is generally credited with having isolated the metal in 1827, although an impure form was prepared by Oersted two years earlier. In 1807, Davy proposed the name aluminum for the metal, undiscovered at that time, and later agreed to change it to aluminum. Shortly thereafter, the name aluminium was adopted to conform with the "ium" ending of most elements, and this spelling is now in use elsewhere in the world. Aluminium was also the accepted spelling in the U.S. until 1925, at which time the American Chemical Society officially decided to use the name aluminum thereafter in their publications. The method of obtaining aluminum metal by the electrolysis of alumina dissolved in cryolite was discovered in 1886 by Hall in the U.S. and at about the same time by Heroult in France. Cryolite, a natural ore found in Greenland, is no longer widely used in commercial production, but has been replaced by an artificial mixture of sodium, aluminum, and calcium fluorides. Bauxite, an impure hydrated oxide ore, is found in large deposits in Jamaica, Australia, Surinam, Guyana, Arkansas, and elsewhere. The Bayer process is most commonly used today to refine bauxite so it can be accommodated in the Hall-Heroult refining process, used to make most aluminum. Aluminum can now be produced from clay, but the process is not economically feasible at present. Aluminum is the most abundant metal to be found in the earth's crust (8.1%), but is never found free in nature. In addition to the minerals mentioned above, it is found in feldspars, granite, and in many other common minerals. Seventeen isotopes and isomers are known. Natural aluminum is made of one isotope, ^{27}Al . Pure aluminum, a silvery-white metal, possesses many desirable characteristics. It is light, nontoxic, has a pleasing appearance, can easily be formed, machined, or cast, has a high thermal conductivity, and has excellent corrosion resistance. It is nonmagnetic and nonsparking, stands second among metals in the scale of malleability, and sixth in ductility. It is extensively used for kitchen utensils, outside building decoration, and in thousands of industrial applications where a strong, light, easily constructed material is needed. Although its electrical conductivity is only about 60% that of copper, it is used in electrical transmission lines because of its light weight. Pure aluminum is soft and lacks strength, but it can be alloyed with small amounts of copper, magnesium, silicon,

manganese, and other elements to impart a variety of useful properties. These alloys are of vital importance in the construction of modern aircraft and rockets. Aluminum, evaporated in a vacuum, forms a highly reflective coating for both visible light and radiant heat. These coatings soon form a thin layer of the protective oxide and do not deteriorate as do silver coatings. They have found application in coatings for telescope mirrors, in making decorative paper, packages, toys, and in many other uses. The compounds of greatest importance are aluminum oxide, the sulfate, and the soluble sulfate with potassium (alum). The oxide, alumina, occurs naturally as ruby, sapphire, corundum, and emery, and is used in glassmaking and refractories. Synthetic ruby and sapphire have found application in the construction of lasers for producing coherent light. In 1852, the price of aluminum was about \$1200/kg, and just before Hall's discovery in 1886, about \$25/kg. The price rapidly dropped to 60¢ and has been as low as 33¢/kg. The price in December 1995 was about \$1.70/kg.