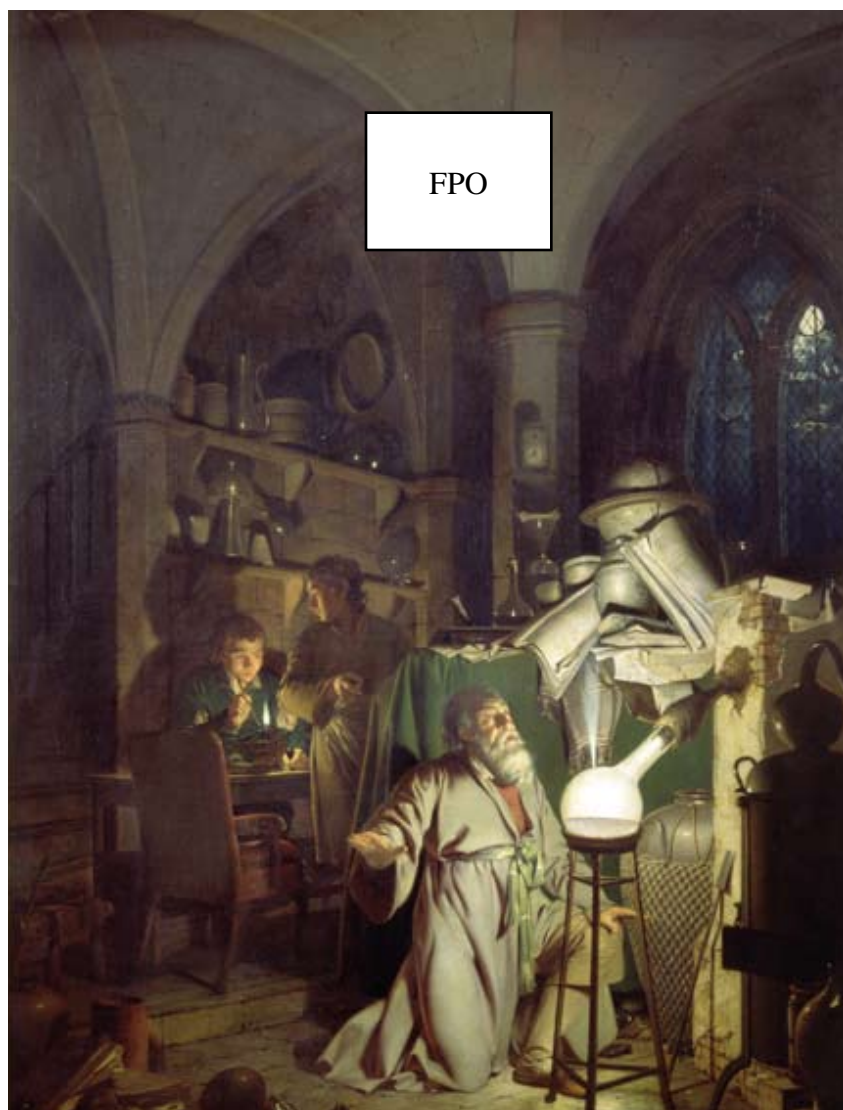


INTERCHAPTER A

Elemental Etymology

*What's in a Name?**

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Alchemist in Search of the Philosopher's Stone Discovers Phosphorus, 1795, by Joseph Wright of Derby

*Adapted with permission from the *Journal of Chemical Education*, volume 62 (September 1985), pages 787–788.

Like any discipline of science, chemistry has its own nomenclature, or system of naming. Mastery of this nomenclature is essential for the survival of any chemistry student. Initially, students may be scared witless by the seemingly complex organic and inorganic names. Soon, though, they are rattling off polysyllabic words with the ease of an expert.

The names of the elements provide the root of chemical naming, from simple salts to coordination compounds, from simple acids and bases to complicated organic species. While chemistry students use the names of the elements to name compounds, many of them have no idea of how the elements *themselves* got their names. For example, many students perceive the connection between the name “hydrogen” and the prefix “hydro-,” meaning “water,” but most do not know the meanings behind other element names. Study of element names can be used as an important tool for recognizing certain properties of particular elements, and the origins themselves can make excellent mnemonic devices in remembering an element's properties, symbol, and uses. Let's, then, take a close look at the origin of the names, or etymologies, of the chemical elements.

Most of the available etymological information can be obtained from a dictionary or a chemical handbook, but neither points out the fact that there are many similarities and trends among the names. For example, many people immediately notice that a

few elements are named after famous scientists. What they may not realize, however, is that a few elements are named after prominent mythological figures, too. To illustrate these patterns better (and to increase the pedagogical value of this interchapter), we have grouped the elements in six categories according to the origins of their names.

It is generally accepted by scientists that the discoverer of an element has the honor of naming it. However, the International Union of Pure and Applied Chemistry (IUPAC) reserves the right to select an approved name, as well as an approved symbol, regardless of the priority of discovery. The only IUPAC rule governing the naming process is the inclusion of the *-ium* suffix in the name of any new metallic element. However, because many elements were discovered before the existence of this rule, many elements (nonmetals as well as metals) do not have this suffix.

Table A.1 lists elements of ancient or even prehistoric discovery and whose names are of obscure origins. These seven elements, six of them metals, have been known and used by human beings for thousands of years; a few of these names are among the oldest words in any language. Unlike some of the other groups of elements, these ancient names follow no standard form and have no common or distinguishing syllables.

Table A.2 lists elements that are named because of the color of the element or its compounds and prop-

TABLE A.1 Elements with names of obscure origin

Element	Origin*
gold	Sanskrit, <i>jval</i> ; Ang.-Sax., <i>gold</i> ; ME, <i>guld</i>
iron	Ang.-Sax., <i>iron</i> ; ME, <i>iren</i>
lead	Ang.-Sax., <i>lead</i> ; ME, <i>leed</i>
silver	Ang.-Sax., <i>seolfor</i> , <i>sylfer</i>
sulfur	Sanskrit, <i>sulvere</i> ; ME, <i>sulphre</i>
tin	Ang.-Sax., <i>tin</i> ; ME, <i>tin</i>
zinc	Ang.-Sax., <i>zinc</i>

*Key to all tables: Ang.-Sax. = Anglo-Saxon, Eng. = English, Ger. = German, Gr. = Greek, L. = Latin, ME = Middle English, Sp. = Spanish, Swed. = Swedish.

TABLE A.2 Elements named for colors

Element	Origin
bismuth	Ger., <i>weisse Masse</i> , white mass
cesium	L., <i>caesius</i> , sky blue
chlorine	Gr., <i>chloros</i> , greenish yellow
chromium	Gr., <i>chroma</i> , color
indium	the color indigo
iodine	Gr., <i>iodes</i> , violet
iridium	L., <i>iris</i> , rainbow
praesodymium	Gr., <i>prasios</i> + <i>didymos</i> , green twin
rubidium	L., <i>rubidos</i> , deepest red
zirconium	Arabic, <i>zargun</i> , gold color

erties. For example, since the salts of iridium are of various colors, it seems appropriate that the element name is derived from a word meaning “rainbow.” Chlorine and iodine are named for their respective colors, whereas rubidium, a silvery-white metal, is named for the intense ruby line in its atomic spectrum. The other elements listed here have similar etymologies.

Table A.3 gives the elements that are named after real or imaginary personages. About half of these elements are named after famed scientists; the other half are named after various mythological figures. Note that all but three of the elements discovered since 1952 (beginning with einsteinium, element 99) have been named after people (darmstadtium, dubnium, and hassium were named for places).

TABLE A.3 Elements named after people (real or mythical)

Element	Origin
bohrium	Niels Bohr, Danish physicist, pioneer in quantum mechanics
copernicium	Nicolaus Copernicus, proposed the heliocentric model of the solar system
curium	Pierre and Marie Curie, discoverers of radium
einsteinium	Albert Einstein, originator of the theories of relativity
fermium	Enrico Fermi, pioneer in nuclear physics
gadolinium	Johann Gadolin, a Finnish chemist who discovered yttrium
lawrencium	Ernest O. Lawrence, developer of the cyclotron
meitnerium	Lise Meitner, Austrian-Swedish physicist, discoverer of nuclear fission
mendelevium	Dmitri Mendeleev, developer of the periodic table
niobium	Niobe, an evil and blasphemous daughter of Tantalos (see below)
nobelium	Alfred Nobel, founder of the Nobel Prizes and inventor of dynamite
promethium	Prometheus, the Greek god who gave mankind fire
roentgenium	Wilhem Conrad Röntgen, German physicist, discoverer of X-rays
rutherfordium	Ernest Rutherford, classified radiation and discovered the proton
seaborgium	Glenn T. Seaborg, synthesized ten transuranium elements
tantalum	Tantalos, the Greek mythical figure banished to a tantalizing fate in Hades
thorium	Thor, the Norse god of thunder
titanium	the Titans, Greek gods
vanadium	Vanadis, a “Wise Woman” in Scandinavian mythology

Table A.4 lists elements whose names are derived from some geographic location. At least five countries are represented, one of them twice (gallium comes from *Gallia*, the Latin name for France). A total of four elements are named after Ytterby, a small Swedish town about 10 miles north of Goteborg,

Sweden's second largest city. There is a quarry in Ytterby where many unusual minerals were found, and from these minerals yttrium, erbium, terbium, and ytterbium were discovered. Ytterby has the distinction of being the most used root in the naming of the elements.

TABLE A.4 Elements named after places

Element	Origin
americium	the Americas
berkelium	Berkeley, California
californium	California
copper	L., <i>cuprum</i> , from the island of Cyprus
darmstadtium	Darmstadt, Germany
dubnium	Dubna Nuclear Institute, Russia
erbium	Ytterby, a town in Sweden
europium	Europe
francium	France
gallium	L., <i>Gallia</i> , France
germanium	Germany
hafnium	L., <i>Hafnia</i> , Copenhagen
hassium	German state, Hesse
holmium	L., <i>Holmia</i> , Stockholm
lutetium	Lutetia, an ancient name for Paris
magnesium	Magnesia, a district in Thessaly
polonium	Poland
rhenium	L., <i>Rhenus</i> , the Rhine
ruthenium	L., <i>Ruthenia</i> , Russia
scandium	L., <i>Scandis</i> , Scandinavia
strontium	Strontian, a town in Scotland
terbium	Ytterby, a town in Sweden
thulium	Thule, an early name for Scandinavia
ytterbium	Ytterby, a town in Sweden
yttrium	Ytterby, a town in Sweden

Table A.5 lists elements that are named after various heavenly bodies. It seems that objects in the sky had a big influence on the naming of a new element. The sun, moon, two asteroids, and six planets (including the earth) lend their names to elements. For example, although the Greek word *phosphoros* means “light-bearing,” it is also a name applied to the planet Venus under certain conditions. Helium was discovered spectroscopically in the solar atmosphere before it was discovered on earth, and the name helium reflects that discovery. Few people exposed

to chemistry fail to recognize the element sequence uranium–neptunium–plutonium and its connection with local astronomy.

Finally, there are elements that do not fit into the above categories, being named for various other reasons. These elements are listed in Table A.6. Included in this group are three elements named after other elements: radon (from radium), molybdenum (from *molybdos*, a Greek word for lead), and platinum (from *platina*, a Spanish word for silver). Unlike some other categories, a majority of these elements have Greek

TABLE A.5 Elements named after heavenly bodies

Element	Origin
cerium	the asteroid Ceres
helium	Gr., <i>helios</i> , the sun
mercury	the planet Mercury
neptunium	the planet Neptune
palladium	the asteroid Pallas
phosphorus	Gr., <i>phosphoros</i> , light-bearing; a name applied to the planet Venus when appearing as a morning star
plutonium	the dwarf planet Pluto
selenium	Gr., <i>Selene</i> , moon
tellurium	L., <i>tellus</i> , the earth
uranium	the planet Uranus

and Latin roots. Also unlike other groups, many of these elements do not have the common *-ium* ending.

It is worth pointing out that the element oxygen has an erroneous name. Lavoisier, who named oxygen, thought that it was essential in making acids, so he gave the element a name that means “acid producer.” Oxygen is *not* essential in acids, but the name stays anyway.

A quick scan of the element names shows a few naming trends that make excellent mnemonic

devices. For example, only the halogens have names ending with *-ine*. Similarly, all diatomic gases have names ending with *-ine* or *-gen*; no other element has those endings, and all elements with those endings are diatomic gases. With the exception of helium, all the noble gases end with *-on*; however, not all elements with names ending with *-on* are noble gases (e.g., carbon). These examples are easily noted, and exhibit the worth of studying the names of the elements and their origins.

TABLE A.6 Elements having names of miscellaneous origin

Element	Origin	Element	Origin
actinium	Gr., <i>aktinos</i> , beam or ray	molybdenum	Gr., <i>molbydos</i> , lead
aluminum	L., <i>alumen</i> , alum (an astringent)	neodymium	Gr., <i>neo</i> + <i>didymos</i> , new twin
antimony	Gr., <i>anti</i> + <i>monos</i> , not alone, not one	neon	Gr., <i>neos</i> , new
argon	Gr., <i>argos</i> , inactive	nickel	Ger., <i>kupfernickel</i> , niccolate (a mineral)
arsenic	Gr., <i>arsenikos</i> , male or masculine	nitrogen	L., <i>nitrium</i> ; Gr., <i>nitron</i> , native soda
astatine	Gr., <i>astatos</i> , unstable	osmium	Gr., <i>osme</i> , smell or odor
barium	Gr., <i>barys</i> , heavy	oxygen	Gr., <i>oxys</i> + <i>genes</i> , acid-forming
beryllium	Gr., <i>beryl</i> , beryl (a gem)	platinum	Sp., <i>platina</i> , silver
bromine	Gr., <i>bromos</i> , stench	potassium	Eng., <i>potash</i> (a potassium salt)
cadmium	L., <i>cadmia</i> , calamine (a zinc ore)	protactinium	Gr., <i>protos</i> , first, + actinium (see above)
calcium	L., <i>calx</i> , lime (calcium oxide)	radium	L., <i>radius</i> , ray
carbon	L., <i>carbo</i> , coal or charcoal	radon	from radium (see above)
cobalt	Ger., <i>kobald</i> , evil spirit or goblin	rhodium	Gr., <i>rhodios</i> , roselike
dysprosium	Gr., <i>dysprositos</i> , hard to get at	samarium	Eng., <i>samarskite</i> (a mineral)
fluorine	L., <i>fluere</i> , to flow	silicon	L., <i>silex</i> , flint
hydrogen	Gr., <i>hydros</i> + <i>genes</i> , water-forming	sodium	Eng., <i>soda</i>
krypton	Gr., <i>kryptos</i> , hidden	technetium	Gr., <i>technitos</i> , artificial
lanthanum	Gr., <i>lanthanein</i> , to lie hidden	tungsten	Swed., <i>tung</i> + <i>sten</i> , heavy stone
lithium	Gr., <i>lithos</i> , stone	xenon	Gr., <i>xenon</i> , stranger
manganese	L., <i>magnes</i> , magnet		