

NAMES AND SYMBOLS OF COMMON ELEMENTS

©2019, 2002, 1992, 1990 by David A. Katz. All rights reserved.
Reproduction permitted for classroom use as long as the original copyright is included.

David A. Katz

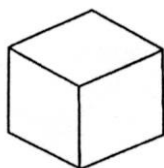
Chemist, Educator, Science Communicator, and Consultant
5003 Canby Dr., Wilmington, DE 19808, USA

Part of the language of chemistry are the names and symbols of the chemical elements. There are 91 naturally occurring elements found on Earth. Once you are familiar with the names and symbols of the more common elements, you will be able to learn to write chemical formulas and to do some simple chemical calculations.

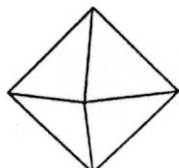
1. A BRIEF HISTORY OF ELEMENT SYMBOLS

The modern symbols used to represent the chemical elements consist of one or two letters from the element's name. Historically, symbols were not always like this.

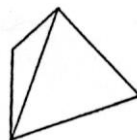
Some of the earliest symbols were those used by the ancient Greeks to represent the four elements earth, air, fire, and water. These were adopted by Plato, using the Pathagorean geometric solids:



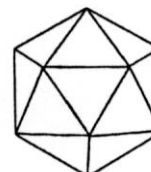
Earth
cubic atoms



Air
octahedral atoms



Fire
tetrahedral atoms



Water
icosahedral atoms

As other chemical substances were defined, symbols of the planets were used. Over the centuries, a great many symbols came into use. Although there were many similarities, the secrecy of the alchemists resulted in many variations.

Geoffrey Chaucer, in his Canon Yeoman's Tale from the *Canterbury Tales*, related the symbols as:

*Gold for the sun and silver for the moon,
Iron for Mars and quicksilver in tune
With mercury, lead which prefigures Saturn
And tin for Jupiter. Copper takes the pattern
Of Venus if you please! ...*

A chart of chemical symbols in use about 1780 is shown in Figure 1.

John Dalton, in advocating his atomic theory, recommended symbols composed of circles. Examples of Dalton's symbols for elements and compounds is shown in Figure 2, along with relative weight scale. Scientists of the day, however, viewed Dalton's symbols as cumbersome and with little improvement over the alchemical based symbols of the day.

Finally, in 1813, Jon Jakob Berzelius devised a system using letters of the alphabet. He argued that letters should be used because they could be written more easily than other signs and did not "disfigure" the printed book. The modernized version of Berzelius' system follows under the heading *System for Determining Symbols of the Elements*

CHYMICAL &c. CHARACTERS.

To Abstract \bar{A} .	To Dissolve \approx	Phlogiston $\Delta \Delta$.
Acid $\sim + > \sim$.	To Distill $d \delta \delta' \delta'' \delta''' \delta''''$	Phosphorus Δ .
— Marine $\ominus \oplus \ominus \oplus$.	Dram } $\angle \dots \bar{\delta}$.	A Pound P $\Phi \Psi \Psi'$.
— Nitrous $\ominus \oplus \ominus \oplus$.	Drachma) $\angle \dots \bar{\delta}$.	Precipitate $\sim \sim$.
— Phosphoric Δ .	Drop G gt. gut. \leftarrow	Prepave PP PP'
— Vegetable Φ .	Each A $\bar{a} \bar{a}\bar{a}$	A Pingil P p.
— Vitriolic $\ominus \oplus \ominus \oplus$.	Earth ∇	Quick-Lime CVYV $\oplus \Psi \Psi'$.
— Volatile Sulphurous Φ .	— absorbent ∇ .	Quicksilver Φ .
Ether $\bar{E} \Delta$.	— of Alum AV \oplus .	Quantefence QE.
Air A $\Delta \Delta \Delta$.	— Calcareous cV ∇ .	A Receiver \oplus .
— Fixed $\Delta f \Delta$.	— Fluor or Fusible $\nabla \Phi$.	Regulus $\Phi \Phi$.
— Mephitic m Δ .	— Sealed ∇ .	— of Antimony Stellated $\Phi \Phi \Phi$.
Alcahest, or Alcohol of Wine \bar{A} .	— Siliceous or Vitrescible $\nabla \Phi$.	— Stellated $\Phi \Phi$.
An Alembic V XX XX XX.	Efence Efs Φ .	Retort. $\ominus \ominus \ominus \ominus$.
Alkali $\bar{A} \bar{B}$.	Fire Δ	Saffron. \oplus .
— Caustic Fixed c $\oplus \ominus$.	— Circular. \oplus .	— of Copper $\oplus \oplus$.
— Volatile c $\oplus \ominus$.	— Reverberating ΔR .	— of Iron ∇ .
— Fixed $\oplus \ominus \oplus \ominus \oplus \ominus$.	Flours $\nabla \Phi$.	Salt \oplus .
— Milder Fixed m $\oplus \ominus$.	Glass XX $\ominus \ominus$.	— Alkaline $\bar{A} \bar{B}$.
— Vol. $\oplus \ominus \oplus \ominus \oplus \ominus$.	Gold \oplus .	— Ammoniac X $\bar{X} \oplus \oplus \oplus$.
Amalgam $\bar{a} \bar{a} \bar{a} \bar{A}$.	— Filings of Φ .	— Common $\oplus \oplus$.
Antimony $\ominus \ominus \ominus$.	— Leaf Φ .	— Gem $\ominus \ominus \ominus$.
— Flowers of \ominus .	— Potable $\oplus P$.	— Sea $\oplus \oplus \oplus$.
Aqua Fortis F AF $\nabla \nabla \nabla$.	A Grain gr. o.	— Salative SS.
— Regia AR $\bar{A} \bar{R} \bar{R}$.	Gum \sim .	Sand \dots .
— Vitae AV $\nabla \nabla \nabla$.	Gypsum ∇ .	A Scruple \ominus .
Arsenic X $\ominus \ominus \ominus$.	Half $\bar{h} \bar{h}$.	Seal Hermetically SH.
— Regulus of \ominus .	Harts Horn CC.	Silver $\ominus \bar{A}$.
Asb or Asbes EA $\bar{E} \bar{E} \bar{E}$.	Honey \times .	— Filings of Φ .
— Pot or Pearl $\Psi \Psi$.	An Hour \times .	Spirit. $\sim \ominus \sim$.
Auripigment. $\ominus \ominus \ominus \ominus$.	Iron \ominus .	— of Wine SV $\nabla \nabla$.
Balk. B.	— Filings $\ominus \ominus \ominus$.	— Proof ∇ , or Brandy.
— Sand AB BA.	Layer upon Layer SSS.	— Rectified V \bar{V} .
— Vapour VB.	Lead $\bar{h} \bar{h}$.	Sublimate } \sim .
— Water BM MB.	Lime C \ominus .	Sublime } \sim .
Bismuth B W.	Litharge $\bar{L} \bar{L}$.	Sulphur $\Delta \Delta$.
Blood Stone \bar{B} .	Magnesia M $\bar{V} \bar{M}$.	— Liver of $\oplus \oplus$.
Bole Armenian AB \oplus .	Mercury Φ .	— Mineral call'd Sulphur-Flour \bar{A} .
Borax $\bar{W} \bar{A} \bar{A} \bar{A} \bar{A}$.	— Precipitated $\Phi \sim$.	Talc X X.
Bottle \approx .	— of Saturn $\Phi \bar{h}$.	Tartar Φ .
Brandy AV $\nabla \nabla \nabla$.	— Sublimed $\Phi \bar{h}$.	Tin \bar{Z} .
Brafs $\Phi \Phi$.	Metallic Bodies CM.	Tutty. $\Phi \Phi$.
Calamine Stone LC $\bar{I} \bar{C}$.	— Substances SM MS.	Urine $\square \square$.
To Calcine $\bar{A} \bar{C} \bar{C}$.	Mix m.	Vendigrise \oplus .
Camphor \approx yr.	Modius M.	— Distilled. $\oplus \bar{d} \bar{d}$.
Caput Mortuum $\ominus \ominus \ominus$.	A Month $\bar{V} \bar{M}$.	Vinegar $\bar{V} \bar{V}$.
To Cement Z \bar{Z} .	Nickel N.	— Distilled. $\times \times$.
Cerufs $\bar{I} \bar{h} \bar{h}$.	Night $\ominus \ominus$.	Vitriol $\oplus \oplus \oplus \oplus$.
Cinnabar $\bar{C} \bar{h} \bar{h} \bar{h}$.	Nitre \ominus .	Volatile $\ominus \ominus$.
Clay ∇ .	Oil $\ominus \ominus \ominus \ominus \oplus \bar{A}$.	Water ∇ .
Copper Φ .	— Essential E. \bar{A} .	— Lime ∇ .
Crab \ominus .	— Fixed ∇ .	Wax $\Phi \ominus \oplus$.
A Crucible X $\bar{h} \bar{h} \bar{h} \bar{h}$.	— Olive \bar{O} .	Wine V.
Cucurbit $\Delta \Delta$.	An Ounce $\bar{O} \bar{z}$.	— Lees \bar{L} .
Day $\ominus \ominus$.	A Part p. p.	A Year \bar{Y} .
Digest $\bar{D} \bar{D} \bar{D}$.	Pileum \bar{P} .	Zinc $\bar{Z} \bar{Z} \bar{Z}$.

Figure 1. A chart of chemical symbols and characters in use about 1780.
(Reproduced from the collection of David A. Katz)

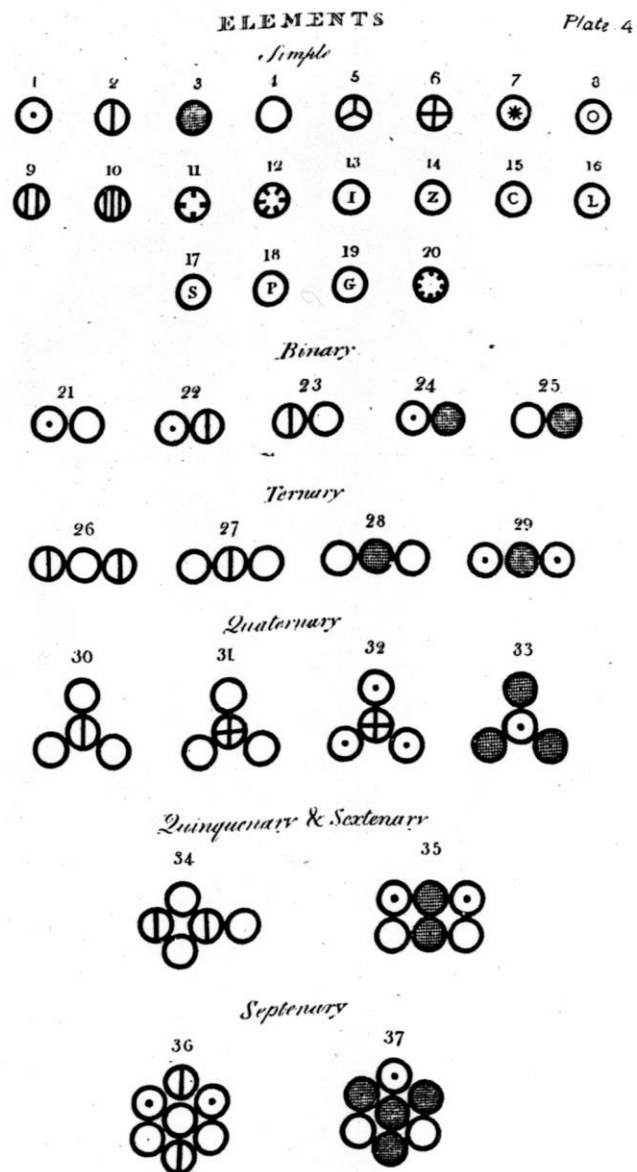


PLATE IV. This plate contains the arbitrary marks or signs chosen to represent the several chemical elements or ultimate particles.

Fig.		Fig.	
1	Hydrog. its rel. weight 1	11	Strontites - - - 46
2	Azote, - - - - - 5	12	Barytes - - - - - 68
3	Carbone or charcoal, - 5	13	Iron - - - - - 38
4	Oxygen, - - - - - 7	14	Zinc - - - - - 56
5	Phosphorus, - - - - 9	15	Copper - - - - - 56
6	Sulphur, - - - - - 13	16	Lead - - - - - 95
7	Magnesia, - - - - - 20	17	Silver - - - - - 100
8	Lime, - - - - - 23	18	Platina - - - - - 100
9	Soda, - - - - - 28	19	Gold - - - - - 140
10	Potash, - - - - - 42	20	Mercury - - - - - 167

21. An atom of water or steam, composed of 1 of oxygen and 1 of hydrogen, retained in physical contact by a strong affinity, and supposed to be surrounded by a common atmosphere of heat; its relative weight = - - - - - 8
22. An atom of ammonia, composed of 1 of azote and 1 of hydrogen - - - - - 6
23. An atom of nitrous gas, composed of 1 of azote and 1 of oxygen - - - - - 12
24. An atom of olefiant gas, composed of 1 of carbone and 1 of hydrogen - - - - - 6
25. An atom of carbonic oxide composed of 1 of carbone and 1 of oxygen - - - - - 12
26. An atom of nitrous oxide, 2 azote + 1 oxygen - 17
27. An atom of nitric acid, 1 azote + 2 oxygen - 19
28. An atom of carbonic acid, 1 carbone + 2 oxygen 19
29. An atom of carburetted hydrogen, 1 carbone + 2 hydrogen - - - - - 7
30. An atom of oxynitric acid, 1 azote + 3 oxygen 26
31. An atom of sulphuric acid, 1 sulphur + 3 oxygen 34
32. An atom of sulphuretted hydrogen, 1 sulphur + 3 hydrogen - - - - - 16
33. An atom of alcohol, 3 carbone + 1 hydrogen - 16
34. An atom of nitrous acid, 1 nitric acid + 1 nitrous gas - - - - - 31
35. An atom of acetous acid, 2 carbone + 2 water - 26
36. An atom of nitrate of ammonia, 1 nitric acid + 1 ammonia + 1 water - - - - - 33
37. An atom of sugar, 1 alcohol + 1 carbonic acid - 35

Figure 2 Dalton's system of symbols from his *New System of Chemical Philosophy*, 1808.

System for Determining Symbols of the Elements

1. The symbols of the most common elements, mainly nonmetals, use the first letter of their English name.

Examples: H, B, C, N, O, F, P, S, I

2. If the name of the element has the same initial letter as another element, then the symbol uses the first and second letters of their English name.

Examples: He, Li, Be, Ne, Al

3. If the first two letters of the element name are the same as another element, then the symbol consists of the first letter and the first consonant of the English name that they do not have in common.

Examples:

magnesium has the symbol Mg
(first letter and first consonant)

manganese has the symbol Mn

chlorine has the symbol Cl
(first letter and first consonant NOT in common)

chromium has the symbol Cr

4. Some symbols are based on the old name or Latin name of the element. There are eleven elements:

Na	natrium	Sb	stibium
K	kalium	W	wolfram
Fe	ferrum	Au	aurum
Cu	cuprum	Hg	hydrargyrum
Ag	argentum	Pb	plumbum
Sn	stannum		

5. New elements, or those with disputed claims for discovery/ synthesis are named using three letters based on the Latin for their atomic numbers:

First letter:	U from Uni or Un = 1
Second letter:	n from nil = 0
Third letter:	From latin numerical prefix:
	q for quad = 4
	p for pent = 5
	b for hex = 6
	s for sept = 7
	o for oct = 8
	e for ennea = 9

2. MODERN CHEMICAL SYMBOLS

Listed below are the atomic numbers, names, and symbols of the most common elements. The atomic number is used to determine the place of the element in the periodic table, it also has other meaning as you will find out later in the course.

Become familiar with the names and symbols of these elements.

Atomic Number	Name	Symbol	Atomic Number	Name	Symbol
1	hydrogen	H	28	nickel	Ni
2	helium	He	29	copper	Cu
3	lithium	Li	30	zinc	Zn
4	beryllium	Be	33	arsenic	As
5	boron	B	35	bromine	Br
6	carbon	C	36	krypton	Kr
7	nitrogen	N	37	rubidium	Rb
8	oxygen	O	38	strontium	Sr
9	fluorine	F	47	silver	Ag
10	neon	Ne	48	cadmium	Cd
11	sodium	Na	50	tin	Sn
12	magnesium	Mg	51	antimony	Sb
13	aluminum	Al	53	iodine	I
14	silicon	Si	54	xenon	Xe
15	phosphorus	P	55	cesium	Cs
16	sulfur	S	56	barium	Ba
17	chlorine	Cl	74	tungsten	W
18	argon	Ar	78	platinum	Pt
19	potassium	K	79	gold	Au
20	calcium	Ca	80	mercury	Hg
21	scandium	Sc	82	lead	Pb
22	titanium	Ti	83	bismuth	Bi
23	vanadium	V	86	radon	Rn
24	chromium	Cr	87	francium	Fr
25	manganese	Mn	88	radium	Ra
26	iron	Fe	92	uranium	U
27	cobalt	Co			

