

Elements and Their Symbols

You are expected to know the following list of element and ions by memory. You need to know the name and chemical symbol of each of these elements.

IA - Alkali Metals

H – hydrogen also known as protium ^1H

D – deuterium, ^2H

T – tritium, ^3H

Li – lithium, from *lithos*

Na – sodium, from *natrium*

K – potassium, from *kalium*

Cs – cesium, from *caesium*

IIA - Alkaline Earth Metals

Be – beryllium

Mg – magnesium

Ca – calcium

Sr – strontium

Ba – barium

Ra – radium

IIIA

B – boron

Al – aluminum

Ga – gallium

Tl – thallium

IVA

C – carbon

Si – silicon

Ge – germanium

Sn – tin, from *stannum*

Pb – lead, from *plumbum*

VA - Nitrogen Group

N – nitrogen

P – phosphorus

As – arsenic

Sb – antimony, from *stibium*

Bi – bismuth

VIA - Chalcogen Family (also Oxygen Family)

O – oxygen

S – sulfur

Se – selenium

Te – tellurium

VII - Halogens

F – fluorine

Cl – chlorine

Br – bromine

I – iodine

VIIIA - Noble Gases

He – helium

Ne – neon

Ar – argon

Kr – krypton

Xe – xenon

Rn – radon

Selected Transition Metals

Ti – titanium

Zr – zirconium

V – vanadium

Cr – chromium

Mo – molybdenum

W – tungsten, from *wolfram*

Mn – manganese

Fe – iron, from *ferrum*

Os – osmium

Co – cobalt

Ir – iridium

Ni – nickel

Pd – palladium

Pt – platinum

Cu – copper, from *cuprum*

Ag – silver, from *argentum*

Au – gold, from *aurum*

Zn – zinc

Cd – cadmium

Hg – mercury, from *hydrargyrum*

Tc – technetium

Rare Earth Elements

Ac – actinium
Am – americum
Ce – cerium
Th – thorium
Pr – Praseodymium
Nd – Neodymium
Pm – Promethium
U – uranium
Pu – plutonium

Common Ions and Their Valences

NH₃ ammonia

NH₄⁺ ammonium

For the simple anions, drop the ending of the elements name and add *-ide*.

To convert the anion to the corresponding "acid," drop the *-ide* or *-ate* and add *-ic acid*

For anions ending in *-ite*, the corresponding "acid" is named by dropping the *-ite* and adding *-ous acid*.

Element	Anion	Name	Corresponding Acid	Name
C – carbon	C ₂ ⁻²	carbide	H ₂ C ₂	acetylene
N – nitrogen	N ₃ ⁻	azide	HN ₃	azine
O – oxygen	O ⁻²	oxide	H ₂ O	water
S – sulfur	S ⁻²	sulfide	H ₂ S	hydrogen sulfide
Se – selenium	Se ⁻²	selenide	H ₂ Se	hydrogen selenide

The Halogens

The halogens form 3 of the 7 **strong acids**. (The first, HF, is considered a weak acid because it does not dissociate completely.) The anion is named by dropping the *-ine* of the element name and adding *-ide*. The name of the corresponding acid is made by putting *hydro-* in front of the anion name, dropping *-ide* and adding *ic acid*.

Halogen	Anion	Name	Corresponding Acid	Name
F fluorine	F ⁻	fluoride	HF	hydrofluoric acid
Cl chlorine	Cl ⁻	chloride	HCl	hydrochloric acid
Br bromine	Br ⁻	bromide	HBr	hydrobromic acid
I iodine	I ⁻	iodide	HI	hydroiodic acid

The "Other Oxides"

These "salts" are ancient and the names were in such widespread usage that the common (archaic) name is used as the IUPAC standard. The acid names are derived from the element names. If the anion name ends in *-ate*, the corresponding acid will be a modification of the element's name with *-ic acid*. If the anion (salt) ends in *-ite*, the acid name will end in *-ous acid*

NO ₂ ⁻	nitrite	HNO ₂	nitrous acid	
NO ₃ ⁻	nitrate	HNO ₃	nitric acid	strong acid
CO ₃ ⁻²	carbonate	H ₂ CO ₃	carbonic acid	

With most divalent anions there is an intermediate form that includes a H. The IUPAC name for this anion is "hydrogen anion," the archaic name (still much used) is **bi**anion. Since the H counts as a +1 charge, the anion's overall charge is now -1.

	IUPAC		Archaic	
CO_3^{-2}	carbonate			
HCO_3^-	hydrogen carbonate		bicarbonate	
SO_3^{-2}	sulfite	H_2SO_3	sulfurous acid	
SO_4^{-2}	sulfate	H_2SO_4	sulfuric acid	strong acid
HSO_4^-	hydrogen sulfate		bisulfate	
HSO_3^-	hydrogen sulfite		bisulfite	
PO_3^{-3}	phosphite	H_3PO_3	phosphorous acid	
PO_4^{-3}	phosphate	H_3PO_4	phosphoric acid	
PO_4^{-3}	phosphate		tribasic phosphate	
HPO_4^{-2}	hydrogen phosphate		dibasic phosphate	
H_2PO_4^-	dihydrogen phosphate		monobasic phosphate	

unless multiple forms exist, mono is understood and is generally not included in the name.

1	mono	7	hepta
2	di	8	octa
3	tri	9	nona
4	tetra	10	deca
5	penta	11	undeca
6	hexa	12	dodeca

Oxides of Halogens (other than F)

ClO_4^-	perchlorate	HClO_4	perchloric acid	strong acid
ClO_3^-	chlorate	HClO_3	chloric acid	strong acid
ClO_2^-	chlorite	HClO_2	chlorous acid	
ClO^-	hypochlorite	HClO	hypochlorous acid	
BrO_4^-	perbromate	HBrO_4	perbromic acid	
BrO_3^-	bromate	HBrO_3	bromic acid	
BrO_2^-	bromite	HBrO_2	bromous acid	
BrO^-	hypobromite	HBrO	hypobromous acid	
IO_4^-	periodate	HIO_4	periodic acid	
IO_3^-	iodate	HIO_3	iodic acid	
IO_2^-	iodite	HIO_2	iodous acid	
IO^-	hypoiodite	HIO	hypoiodous acid	

What about the other divalent anions O^{-2} and S^{-2} ?

O_2^{-2}	oxide	OH^-	hydroxide (IUPAC and common)	STRONG BASE
S_2^{-2}	sulfide	SH^-	hydrogen sulfide mercaptide	