

The Memorization Essentials:

Element names and symbols

Al	Aluminum	Au	Gold	Pt	Platinum
Ar	Argon	He	Helium	K	Potassium
As	Arsenic	H	Hydrogen	Ra	Radium
Ba	Barium	I	Iodine	Rn	Radon
Be	Beryllium	Fe	Iron	Rb	Rubidium
B	Boron	Kr	Krypton	Se	Selenium
Br	Bromine	Pb	Lead	Si	Silicon
Cd	Cadmium	Li	Lithium	Ag	Silver
C	Carbon	Mg	Magnesium	Na	Sodium
Cs	Cesium	Mn	Manganese	Sr	Strontium
Cl	Chlorine	Hg	Mercury	S	Sulfur
Cr	Chromium	Ne	Neon	Te	Tellurium
Co	Cobalt	Ni	Nickel	Th	Thorium
Cu	Copper	N	Nitrogen	Sn	Tin
F	Fluorine	O	Oxygen	W	Tungsten
Fr	Francium	P	Phosphorus	U	Uranium
Xe	Xenon	Zn	Zinc	Ca	Calcium
Sc	Scandium	Bi	Bismuth		

Monatomic ions with only one charge

1+ charge		2+ charge		3+ charge	
H ⁺	Hydrogen	Cd ²⁺	Cadmium	Al ³⁺	Aluminum
Ag ⁺	Silver	Zn ²⁺	Zinc	Sc ³⁺	Scandium
alkali metals	Na ¹⁺ , Li ¹⁺ , etc.	alkaline earth metals	Ca ²⁺ , Mg ²⁺ , etc.	Bi ³⁺	Bismuth
1- charge		2- charge		3- charge	
H ¹⁻	Hydride	O ²⁻	Oxide	N ³⁻	Nitride
halides	F ¹⁻ , Cl ¹⁻ , etc.	S ²⁻	Sulfide	P ³⁻	Phosphide

Monatomic ions with more than one charge

1+ or 2+	2+ or 3+	2+ or 4+
Copper (Cu ¹⁺ , Cu ²⁺) cuprous, cupric	Iron (Fe ²⁺ , Fe ³⁺) ferrous, ferric	Lead (Pb ²⁺ , Pb ⁴⁺) plumbous, plumbic
Mercury (Hg ₂ ²⁺ , Hg ²⁺) mercurous, mercuric	Chromium (Cr ²⁺ , Cr ³⁺) chromous, chromic	Tin (Sn ²⁺ , Sn ⁴⁺) stannous, stannic
	Manganese (Mn ²⁺ , Mn ³⁺ , Mn ⁷⁺)	

Polyatomic ions

1- charge		2- charge		1+ charge	
*	$C_2H_3O_2^{1-}$	Acetate	*	SO_4^{2-}	Sulfate
*	NO_3^{1-}	Nitrate	*	SO_3^{2-}	Sulfite
*	NO_2^{1-}	Nitrite	*	CO_3^{2-}	Carbonate
*	CN^{1-}	Cyanide	**	CrO_4^{2-}	Chromate
*	OH^{1-}	Hydroxide	**	$Cr_2O_7^{2-}$	Dichromate
*	MnO_4^{1-}	Permanganate		$S_2O_3^{2-}$	Thiosulfate
**	ClO_4^{1-}	Perchlorate		$C_2O_4^{2-}$	Oxalate
*	ClO_3^{1-}	Chlorate	**	HPO_4^{2-}	Hydrogen phosphate
**	ClO_2^{1-}	Chlorite			
**	ClO^{1-}	Hypochlorite			
*	HCO_3^{1-}	Hydrogen carbonate			
**	HSO_4^{1-}	Hydrogen sulfate			
**	HSO_3^{1-}	Hydrogen sulfite			
	HS^{1-}	Hydrogen sulfide			
**	$H_2PO_4^{1-}$	Dihydrogen phosphate			
	IO_3^{1-}	Iodate			
	SCN^{1-}	Thiocyanate			

3- charge	
*	PO_4^{3-} Phosphate
*	PO_3^{3-} Phosphite

General chemistry students: Memorize the formulas and charges for the polyions marked with a single asterisk (*).

Honors chemistry students: Memorize the formulas and charges for the polyions marked with both single (*) and double (**) asterisks.

AP chemistry students: Memorize the formulas and charges for all the polyions.

Solubility rules

Salts containing _____ are soluble

1. alkali metals
2. ammonium ion
3. nitrates (NO_3^{1-}), chlorates (ClO_3^{1-}), perchlorates (ClO_4^{1-}), and acetates ($C_2H_3O_2^{1-}$)

Salts that are generally soluble, with some exceptions

4. chlorides (Cl^{1-}), bromides (Br^{1-}), and iodides (I^{1-}) are soluble except those containing silver (Ag^{1+}), mercury(I) (Hg_2^{2+}), and lead(II) (Pb^{2+})
5. sulfates (SO_4^{2-}) except $BaSO_4$, $PbSO_4$, Hg_2SO_4 , and $CaSO_4$

Salts that are generally insoluble, with some exceptions

6. metal oxides, except those of alkali metals, Ca^{2+} , Sr^{2+} , and Ba^{2+} . Recall that soluble metal oxides are basic anhydrides and react with water to give hydroxide ions.
7. hydroxide salts except for those containing NH_4^{1+} alkali metals. The compounds $Ba(OH)_2$, $Sr(OH)_2$, and $Ca(OH)_2$ are slightly soluble.
8. sulfide (S^{2-}), carbonate (CO_3^{2-}), chromate (CrO_4^{2-}), and phosphate (PO_4^{3-}) salts are soluble, except those containing NH_4^{1+} or the alkali metals.