Balancing Equations Process

The process for balancing equations follows this procedure:

1. Write complete reaction (*reactants and products*)
2. Draw Balancing Chart
3. Use ratios to balance 1 atom
4. Change other atoms affected by balancing first atom
5. Balance additional atoms
6. Check overall balance of reaction

Balancing Chart

AB + CD → AD + CB

A -	A -
B -	B -
C -	C -
D -	D –

This chart is required for all reactions that are balanced

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Atomic Ratios in Chemical Equations

The balancing process requires making the number of atoms the same on both sides using atomic ratios.

Ratio	Balance	Ratio	Balance	Ratio	Balance
1/1	Balanced	1/2 | 2/1	2	2/3 | 3/2	6
2/2	Balanced	1/3 | 3/1	3	3/4 | 4/3	12
3/3	Balanced	1/4 | 4/1	4	2/4 | 4/2	4
4/4	Balanced	1/6 | 6/1	6	2/6 | 6/2	6
5/5	Balanced	4/6 | 6/4	12	3/6 | 6/3	6

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Polyatomic Ion Chart

The following is a list of common polyatomic ions

Polyatomic Ion	Ion Formula	Polyatomic Ion	Ion Formula	Polyatomic Ion	Ion Formula
Ammonium	NH_4^{1+}	Hydronium	H_3O^{1+}	Carbonate	CO_3^{2-}
Nitrate	NO_3^{1-}	Cyanide	CN^{1-}	Sulfate	SO_4^{2-}
Fluorate	FO_3^{1-}	Hydroxide	OH^{1-}	Chromate	CrO_4^{2-}
Chlorate	ClO_3^{1-}	Acetate	$C_2H_3O_2^{1-}$	Dichromate	$Cr_2O_7^{2-}$
Bromate	BrO_3^{1-}	Permanganate	MnO_4^{1-}	Oxalate	$C_2O_4^{2-}$
Iodate	IO_3^{1-}	Bicarbonate	HCO_3^{1-}	Phosphate	PO_4^{3-}

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Polyatomic Ion Conjugations

Some polyatomic ions can be changed by change number of oxygens

-ate (*Base*)	Ion Formula	-ite (*-1 oxy*)	Ion Formula	per__ite (*+1 oxy*)	Ion Formula
Chlorate	ClO_3^{1-}	Chlorite	ClO_2^{1-}	Perchlorate	ClO_4^{1-}
Bromate	BrO_3^{1-}	Bromite	BrO_2^{1-}	Perbromate	BrO_4^{1-}
Nitrate	NO_3^{1-}	Nitrite	NO_2^{1-}		
Carbonate	CO_3^{2-}	Carbonite	CO_2^{2-}		
Sulfate	SO_4^{2-}	Sulfite	SO_3^{2-}		
Phosphate	PO_4^{3-}	Phosphite	PO_3^{3-}		

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