

6 Strong Acids		6 Strong Bases	
HClO_4	perchloric acid	LiOH	lithium hydroxide
HCl	hydrochloric acid	NaOH	sodium hydroxide
HBr	hydrobromic acid	KOH	potassium hydroxide
HI	hydroiodic acid	Ca(OH)_2	calcium hydroxide
HNO_3	nitric acid	Sr(OH)_2	strontium hydroxide
H_2SO_4	sulfuric acid	Ba(OH)_2	barium hydroxide

strong acid:



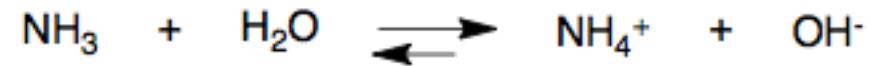
weak acid:



strong base:

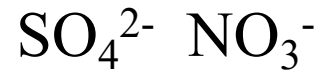


weak base:



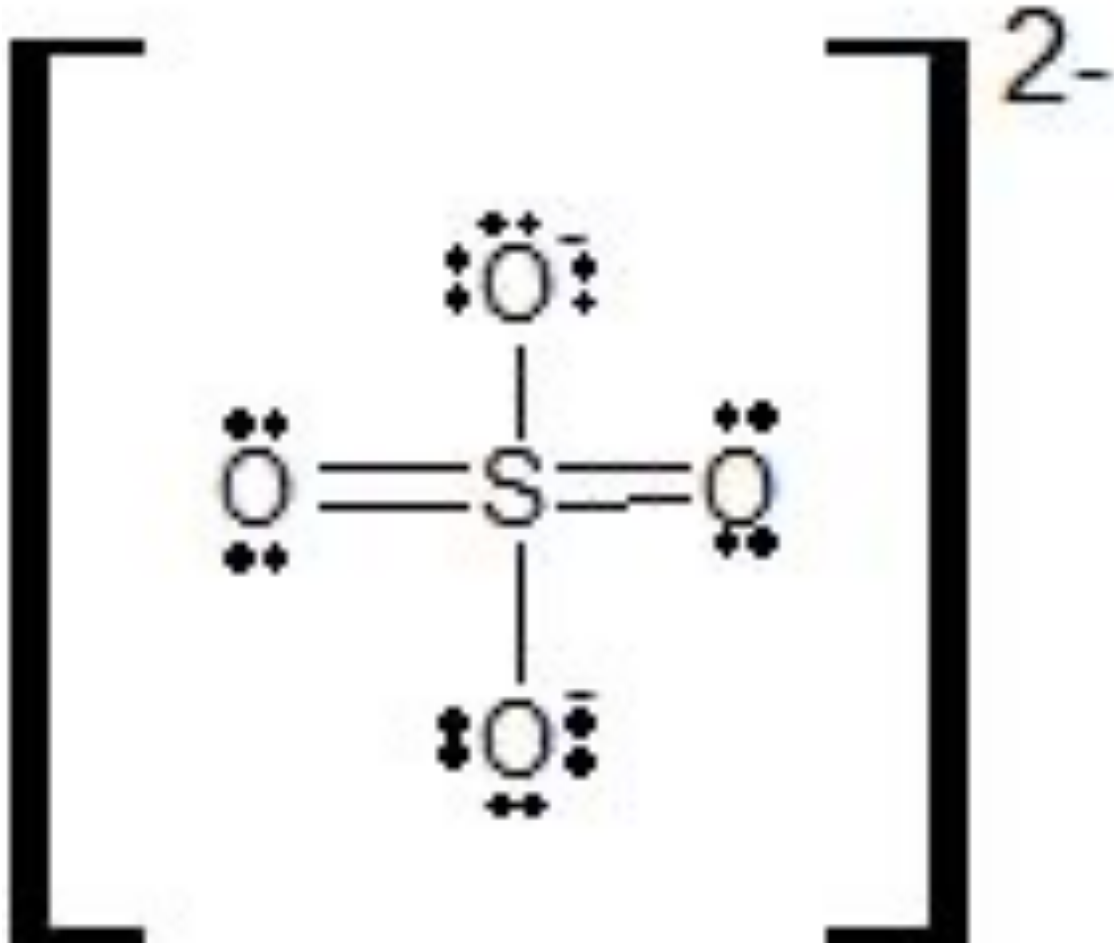
Reminder: ions, ionic
bond, proton

Polyatomic ions

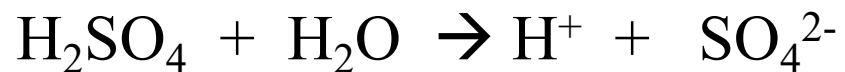


Sulfate ion.

When sulfuric acid H_2SO_4 gives away the proton, the sulfate ion is formed. For a dilute solutions we can write the following (simplified) equation.

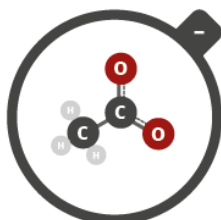


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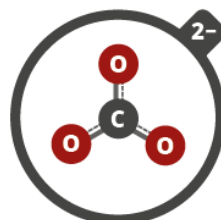
POLYATOMIC IONS: NAMES, FORMULAE & CHARGES

A polyatomic ion is a charged species consisting of two or more atoms covalently bonded together. Here's a guide to some of the most common examples!



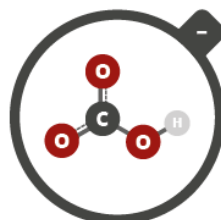
ACETATE

Formula: $C_2H_3O_2^-$



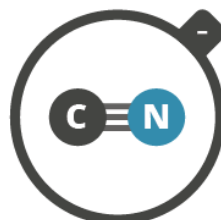
CARBONATE

Formula: CO_3^{2-}



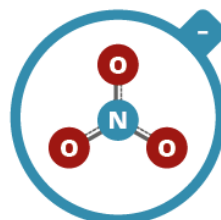
HYDROGEN CARBONATE

Formula: HCO_3^-



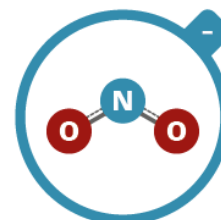
CYANIDE

Formula: CN^-



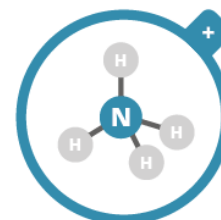
NITRATE

Formula: NO_3^-



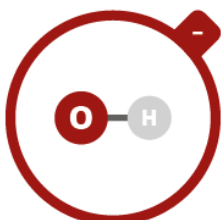
NITRITE

Formula: NO_2^-



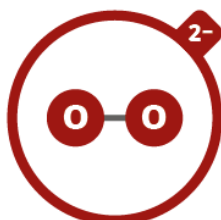
AMMONIUM

Formula: NH_4^+



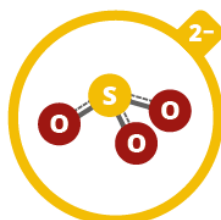
HYDROXIDE

Formula: OH^-



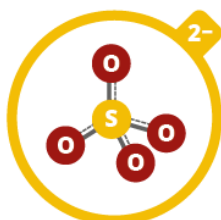
PEROXIDE

Formula: O_2^{2-}



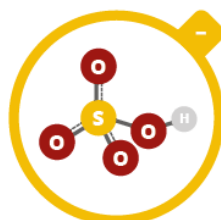
SULFITE

Formula: SO_3^{2-}



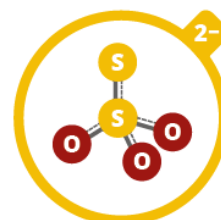
SULFATE

Formula: SO_4^{2-}



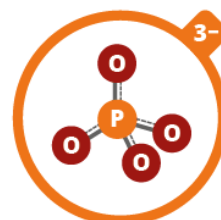
HYDROGEN SULFATE

Formula: HSO_4^-



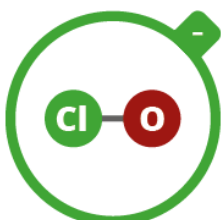
THIOSULFATE

Formula: $S_2O_3^{2-}$



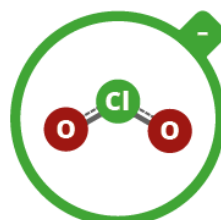
PHOSPHATE

Formula: PO_4^{3-}



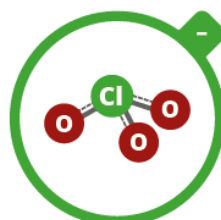
HYPOCHLORITE

Formula: ClO^-



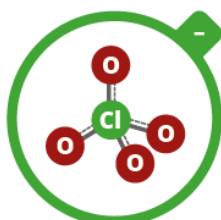
CHLORITE

Formula: ClO_2^-



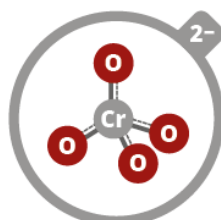
CHLORATE

Formula: ClO_3^-



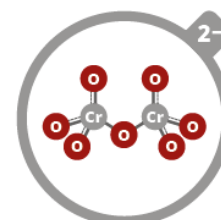
PERCHLORATE

Formula: ClO_4^-



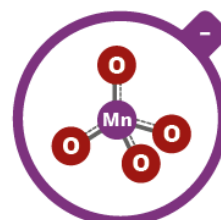
CHROMATE

Formula: CrO_4^{2-}



DICHROMATE

Formula: $Cr_2O_7^{2-}$



PERMANGANATE

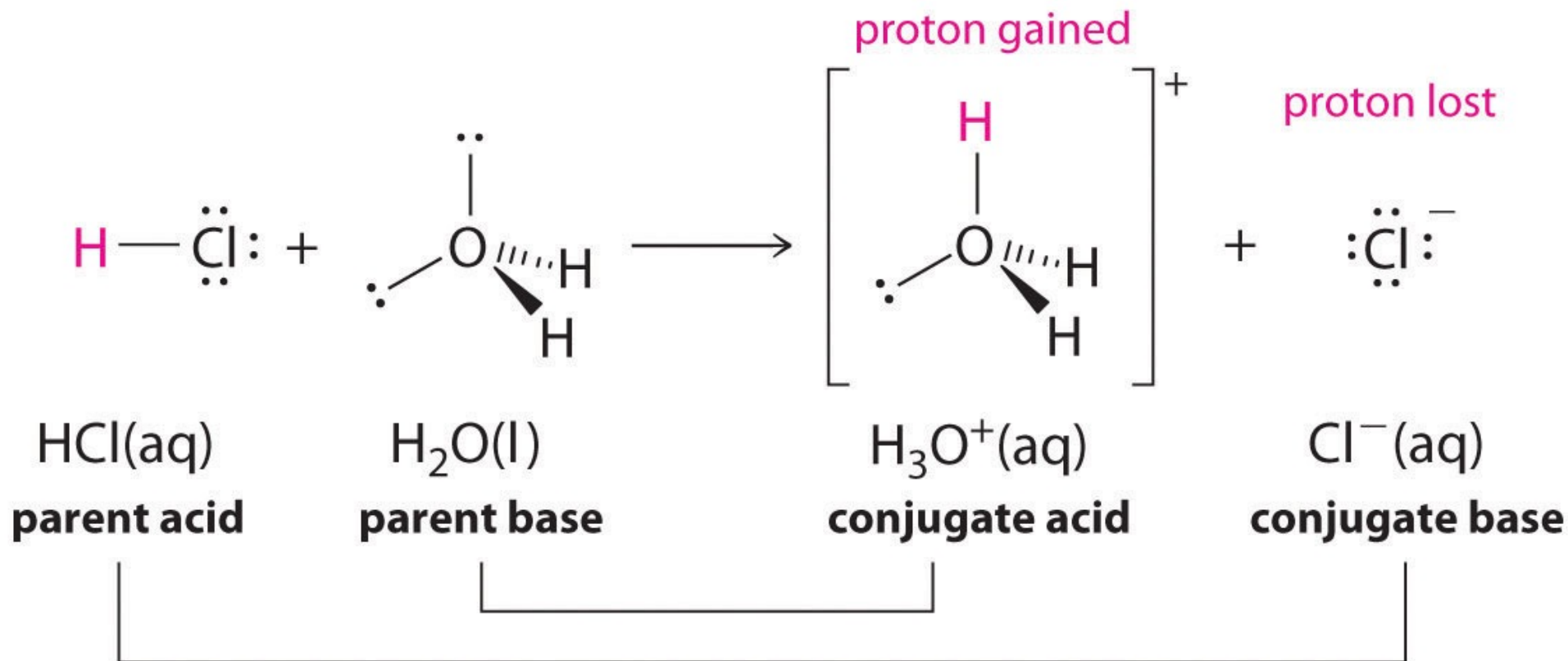
Formula: MnO_4^-



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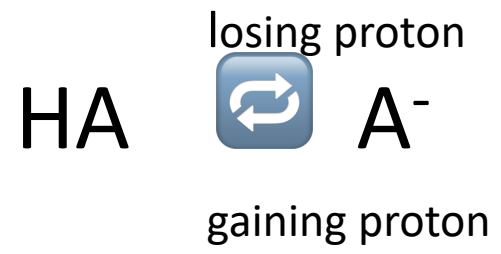
conjugate acid base pairs



Dissociation of water



In pure water the concentration of H⁺ and OH⁻ is equal at 10⁻⁷ mol/L, pH 7.



Some conjugate acid base pairs:

Acids, strongest to weakest	Bases, weakest to strongest
H_2SO_4	HSO_4^-
HI	I^-
HBr	Br^-
HCl	Cl^-
HNO_3	NO_3^-
H_3PO_4	H_2PO_4^-
NH_4^+	NH_3
H_2O	OH^-

	Element	Oxidation Reaction
<p>React vigorously with cold H₂O to form H₂</p> <p>React with steam to form H₂</p> <p>React with simple acids to form H₂</p> <p>Will not dissolve in simple acids</p>	Lithium	Li → Li ⁺ + e ⁻
	Potassium	K → K ⁺ + e ⁻
	Barium	Ba → Ba ²⁺ + 2e ⁻
	Calcium	Ca → Ca ²⁺ + 2e ⁻
	Sodium	Na → Na ⁺ + e ⁻
	Magnesium	Mg → Mg ²⁺ + 2e ⁻
	Aluminum	Al → Al ³⁺ + 3e ⁻
	Manganese	Mn → Mn ²⁺ + 2e ⁻
	Zinc	Zn → Zn ²⁺ + 2e ⁻
	Chromium	Cr → Cr ³⁺ + 3e ⁻
	Iron	Fe → Fe ²⁺ + 2e ⁻
	Cadmium	Cd → Cd ²⁺ + 2e ⁻
	Cobalt	Co → Co ²⁺ + 2e ⁻
	Nickel	Ni → Ni ²⁺ + 2e ⁻
	Tin	Sn → Sn ²⁺ + 2e ⁻
	Lead	Pb → Pb ²⁺ + 2e ⁻
	Hydrogen	H ₂ → 2H ⁺ + 2e ⁻
	Copper	Cu → Cu ²⁺ + 2e ⁻
	Silver	Ag → Ag ⁺ + e ⁻
Mercury	Hg → Hg ²⁺ + 2e ⁻	
Platinum	Pt → Pt ²⁺ + 2e ⁻	
Gold	Au → Au ⁺ + e ⁻	

Increasing ease of oxidation



<https://youtu.be/OBdgeJFzSec>

Solubility table

	Bromide Br^-	Carbonate CO_3^{2-}	Chloride Cl^-	Chlorates ClO_3^-	Hydroxide OH^-	Nitrate NO_3^-	Oxide O^{2-}	Phosphate PO_4^{3-}	Sulfate SO_4^{2-}	Dichromate $\text{Cr}_2\text{O}_7^{2-}$
Aluminium Al^{3+}	S	X	S	S	I	S	I	I	S	I
Ammonium NH_4^+	S	S	S	S	S	S	X	S	S	S
Calcium Ca^{2+}	S	I	S	S	sS	S	sS	I	sS	I
Copper(II) Cu^{2+}	S	I	S	S	I	S	I	I	S	I
Iron(II) Fe^{2+}	S	I	S	S	I	S	I	I	S	I
Iron(III) Fe^{3+}	S	X	S	S	I	S	I	I	sS	I
Magnesium Mg^{2+}	S	I	S	S	I	S	I	I	S	I
Potassium K^+	S	S	S	S	S	S	S	S	S	S
Silver Ag^+	I	I	I	S	X	S	I	I	sS	I
Sodium Na^+	S	S	S	S	S	S	S	S	S	S
Zinc Zn^{2+}	S	I	S	S	I	S	I	I	S	I
	Bromide Br^-	Carbonate CO_3^{2-}	Chloride Cl^-	Chlorates ClO_3^-	Hydroxide OH^-	Nitrate NO_3^-	Oxide O^{2-}	Phosphate PO_4^{3-}	Sulfate SO_4^{2-}	Dichromate $\text{Cr}_2\text{O}_7^{2-}$