

Chemistry

Solubility Rules

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Soluble Compounds		Combinations that are not soluble
Almost all salts of alkali metals (Li^+ , Na^+ , K^+ , Rb^+ , Cs^+) and NH_4^+		
All salts of Cl^- , Br^- and I^-	← Except For →	Ag^+ , Hg_2^{2+} , Pb^{2+}
Salts of F^-	← Except For →	Mg^{2+} , Ca^{2+} , Sr^{2+} , Ba^{2+} , Pb^{2+}
Salts of nitrates, NO_3^- bicarbonates, HCO_3^- chlorates, ClO_3^- perchlorates, ClO_4^- acetates, CH_3COO^-		
All sulfates, SO_4^{2-}	← Except For →	Ag^+ , Ca^{2+} (slightly soluble), Sr^{2+} , Ba^{2+} , Hg_2^{2+} , Pb^{2+}
Insoluble Compounds		Combinations that are soluble
Carbonates, CO_3^{2-} Phosphates, PO_4^{3-} Oxalates, $\text{C}_2\text{O}_4^{2-}$ Chromates, CrO_4^{2-} Sulfides, S^{2-} Hydroxides, OH^- Oxides, O^{2-}	← Except For →	alkali metals (Li^+ , Na^+ , K^+ , Rb^+ , Cs^+) and NH_4^+ (The hydroxides and sulfides of Ca^{2+} , Sr^{2+} and Ba^{2+} are slightly to moderately soluble)

Redox Information

redoxinfo.doc

Oxidation number of some nonmetal compounds

Oxidation Number	Nitrogen Group 5A	Sulfur Group 6A	Chlorine Group 7A
+7			ClO_4^-
+6		SO_4^{2-}	Cl_2O_6
+5	NO_3^-	$\text{S}_2\text{O}_6^{2-}$	ClO_3^-
+4	N_2O_4	SO_3^{2-}	ClO_2
+3	NO_2^-	$\text{S}_2\text{O}_4^{2-}$	ClO_2^-
+2	NO	$\text{S}_2\text{O}_3^{2-}$	
+1	N_2O	S_2Cl^2	ClO^-
0	N_2	S_8	Cl_2
-1	NH_2OH	H_2S_2	Cl^-
-2	N_2H_4	H_2S	
-3	NH_3		

Maximum oxidation number = group number (except: F = -1 and O = -2)

Minimum oxidation number = group number - 8

Species with maximum oxidation state must be reduced in a reaction and is an oxidizing agent.

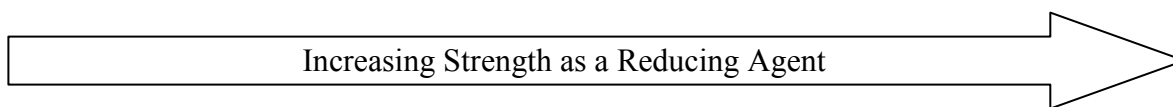
Species with minimum oxidation state must be oxidized in a reaction and is a reducing agent.

Special Notes: SO_3^{2-} is mostly a reducing agent even with an oxidation number of +4

Cl_2 is mostly an oxidizing agent even with an oxidation number of 0.

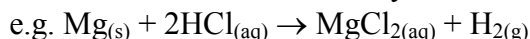
Activity Series of Metals:

(least active) Au, Hg, Ag, Cu, H₂, Pb, Sn, Ni, Cd, Fe, Zn, Cr, Al, Mg, Na, Ca, K (most active)

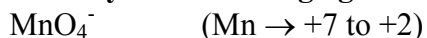


A metal will displace from solution the ions of any metal that lies below it in the activity series.

Metals that lie above H₂ in the activity series will react with acid to produce hydrogen gas



Common analytical oxidizing agents:



Industrial oxidizing agents:

Oxygen

Chlorine (with a 0 or positive oxidation number)

Household oxidizing agents:

Hydrogen peroxide, H₂O₂ (antiseptic)

Benzoyl peroxide, (C₆H₅COO)₂ (acne medication)

Chlorine compounds, (e.g. NaOCl) (Pool water disinfectant)

Common reducing agents: Carbon, Hydrogen

Vitamin reducing agents (antioxidants): C (ascorbic acid), E (tocopherol) – scavenges free radicals