

Recognizing Oxidation-Reduction Reactions

OXIDATION

REDUCTION

Electrons

substance loses electrons

substance gains electrons

Oxidation Number

ON increases

ON decreases

Finding Oxidation Numbers

- 1) For **elements**, ON=0.
- 2) For **monoatomic ions**, ON=**charge on ion**.
 For **alkali metals**, ON=+1; for **alkaline earth metals**, ON=+2.
 For **halogens**, ON=-1 {except when bonded to O} F always -1.
- 3) For **Hydrogen**, ON= +1 with non-metals {ON=-1 with only metals.}
- 4) For **Oxygen**, ON=-2 {for **peroxides** (ROOR), ON=-1.}
- 5) For all other atoms, use rule 6.
- 6) **Sum of all oxidation numbers** of atoms in a molecule or ion **equals charge** on molecule or ion.

Examples

Substance	oxidation numbers			
H ₂ SO ₃	H = +1	O = -2	S = +4	
MnO ₄ ⁻	O = -2	Mn = +7		
Cl ₂	Cl = 0			
Na ₂ C ₂ O ₄	Na = +1	O = -2	C = +3	
Al ⁺³	Al = +3			
Cr ₂ O ₇ ⁻²	O = -2	Cr = +6		
C ₆ H ₁₂ O ₆	O = -2	H = +1	C = 0	
C ₂ H ₆	H = +1	C = -3		
VO ₂ ⁺	O = -2	V = +5		
SO ₄ ⁻²	O = -2	S = +6		
(NH ₄) ₂ CO ₃	O = -2	H = +1	N = -3	C = +4
H ₃ PO ₄	O = -2	H = +1	P = +5	