Oxidation Reduction Redox

1.) O_2

2.) An element standing alone on reactant or product side.

Oxidation #s

Fe Ø

$NaCl$ +1 -1

group 1 always +1

Most of the time the halogens are -1.

$CaCl_2$ +2 -1

group 2 is always +2

CaO +2 -2

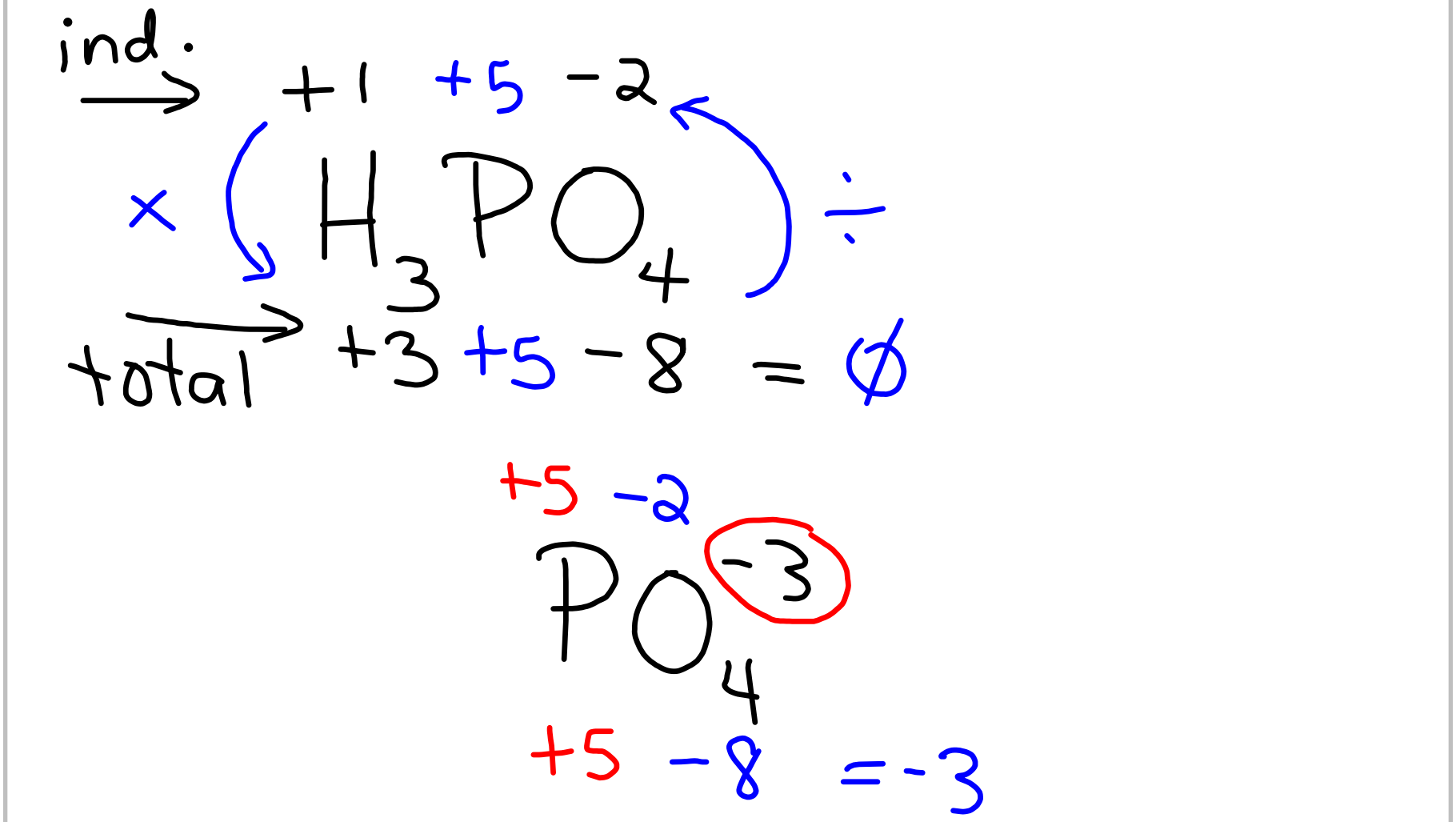
oxygen is always -2

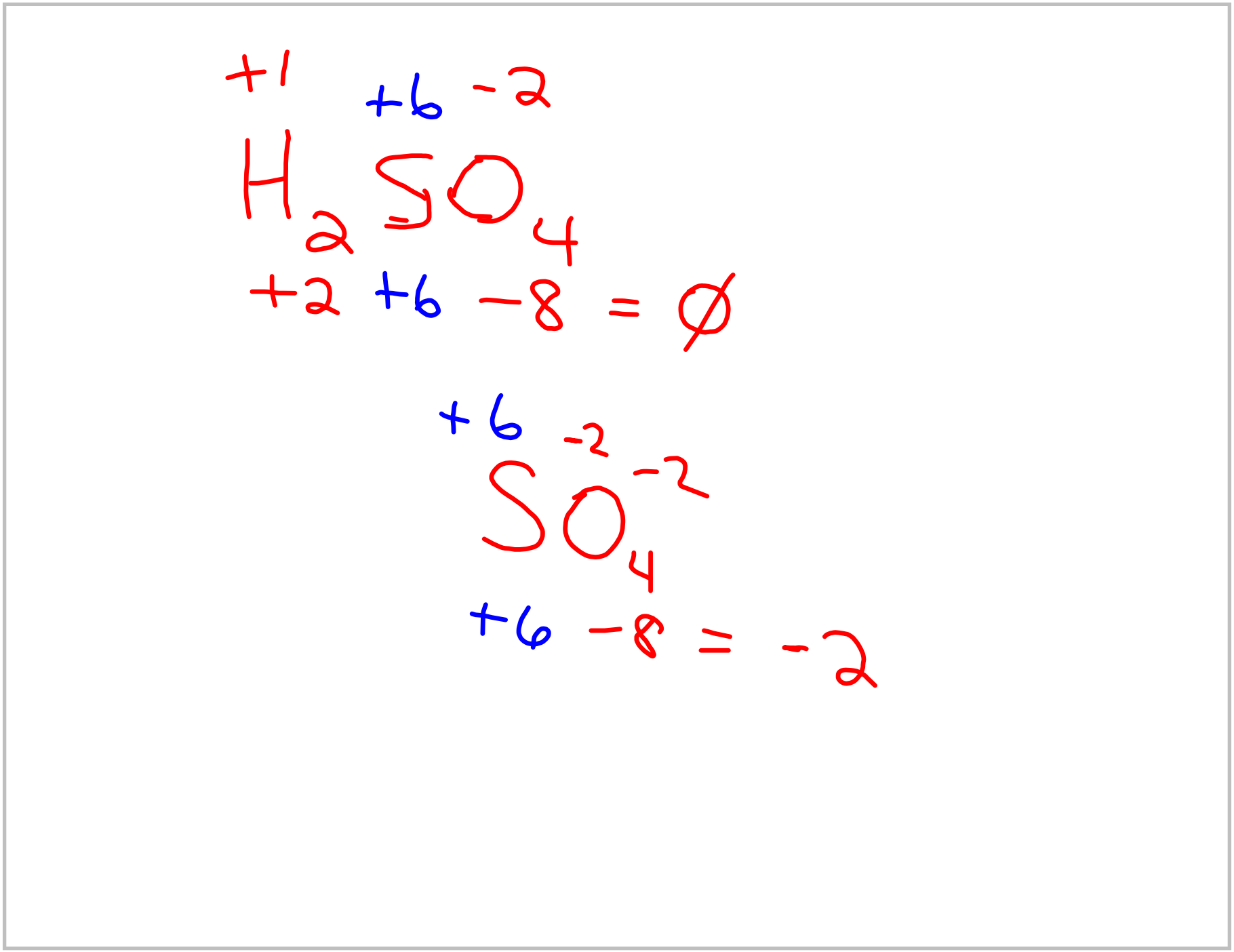
CaF_2 +2 -1

Fluoride is always -1.

Al_2O_3 +3 -2

Aluminum is always +3


ind.
+1 +5 -2
x
H_3PO_4
÷
total
+3 +5 -8 = ∅
+5 -2
PO_4^{-3}
+5 -8 = -3


+1 +6 -2
H2SO4
+2 +6 -8 = 0
+6 -2
SO4 -2
+6 -8 = -2

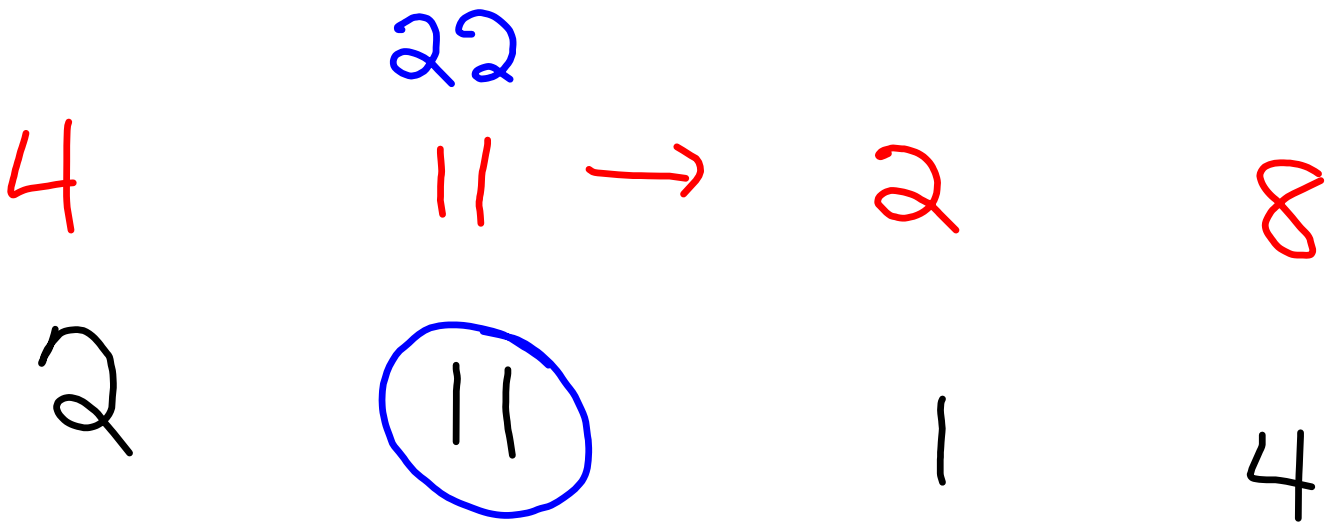
2a.

$KMnO_4$

+1 +7 -2

+1 +7 -8 = ∅

1.b.



2 b. CrO_3

Chromium (VI) oxide

→ $\overset{+6}{Cr}\overset{-2}{O_3}$

$+6 - 6 = 0$

+1 +5, -2

C. Na_3PO_4

$+3 +5 -8 = 0$

$+5$

PO_4^{-3}

$+5 -8 = -3$

2 e. $CsClO_3$

$+1 \quad +5 \quad -2$

$+1 + 5 - 6 = \emptyset$

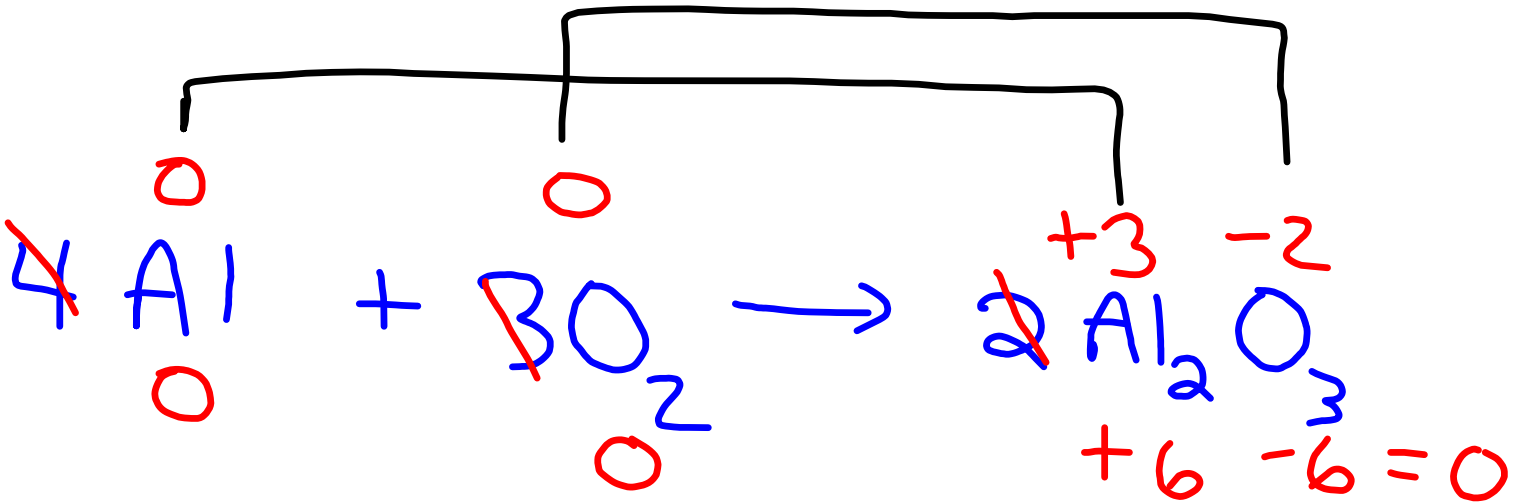
Species oxidized-
Ion or
Atom
means the lose of e^-s.

Species reduced-
gaining e⁻s thus
becoming more −.

Oxidizing agent- the atom or ion that is being reduced.

Reducing agent- the atom or ion that is being oxidized.

3.



Oxidized reduced

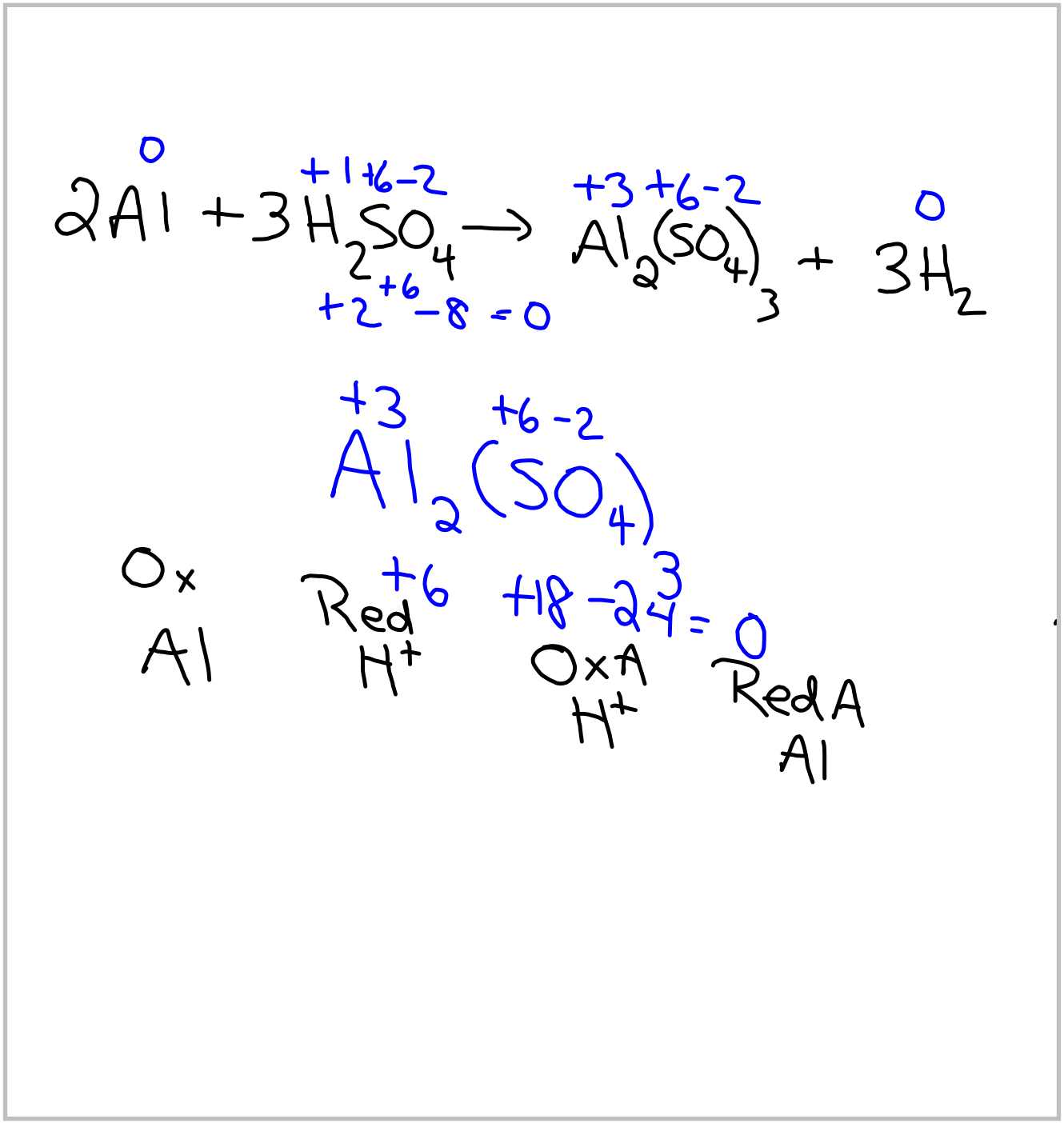
Al O_2

Reducing A

Al

Oxidizing A

O_2


0
+1 +6 -2
+3 +6 -2
0
$2Al + 3H_2SO_4 \rightarrow Al_2(SO_4)_3 + 3H_2$
+2 +6 -8 = 0
+3 +6 -2
$Al_2(SO_4)$
Ox
Al
Red
H+
+6
3
+18 -24 = 0
OxA
H+
RedA
Al

$2NO_2 \rightleftharpoons N_2O_4$

white → brown

$K = \frac{\text{Products}}{\text{reactants}}$

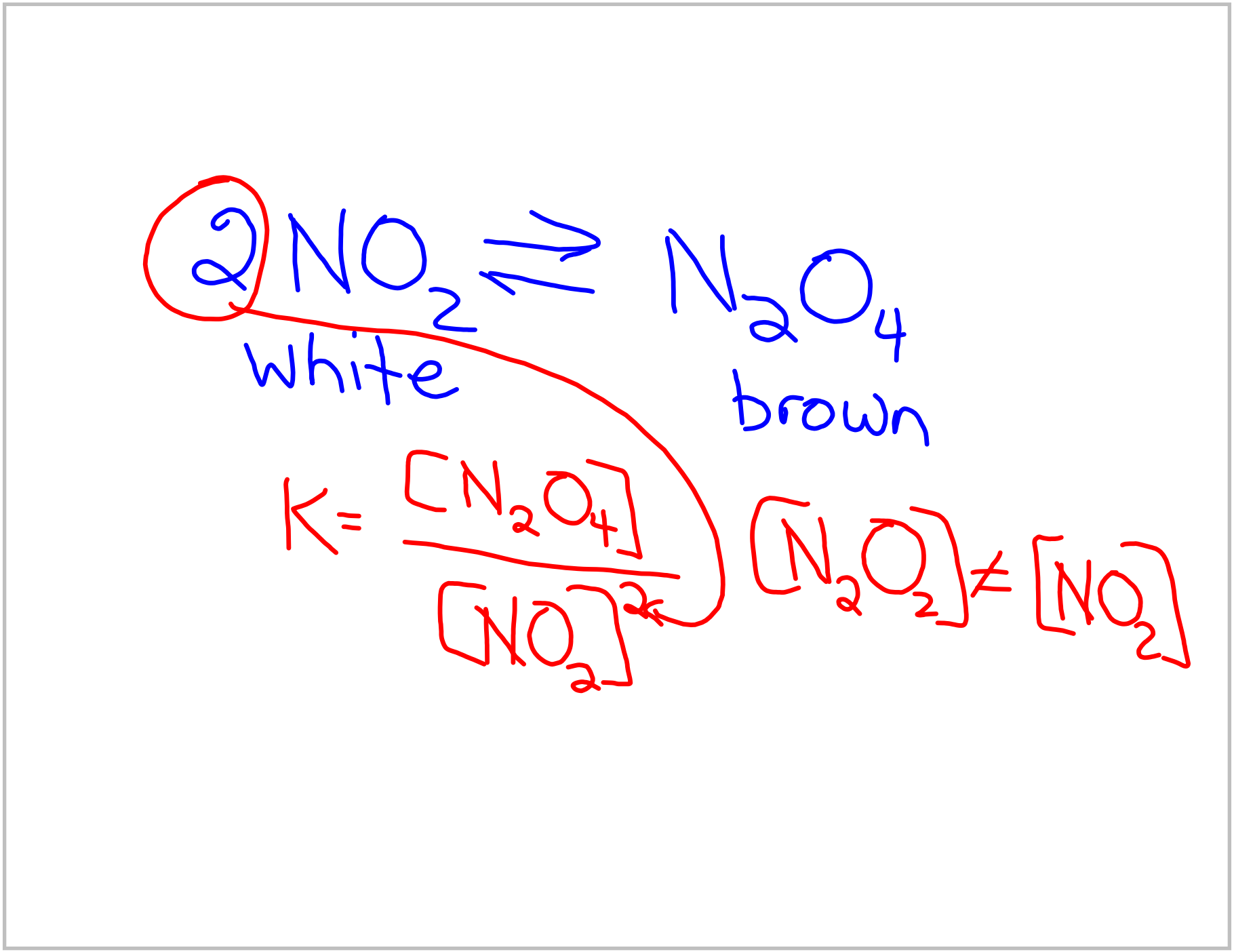
equilibrium constant

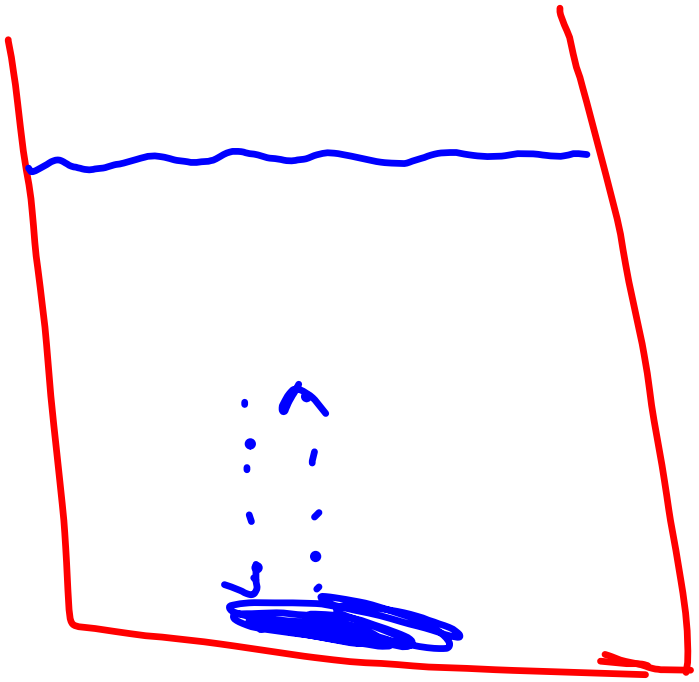
1960s $K > 1$

1980s $K < 1$

K is large there is a lot of product produced.

K is less than 1 there is more reactants than products.


$2NO_2 \rightleftharpoons N_2O_4$
white
brown
$K = \frac{[N_2O_4]}{[NO_2]^2}$
$[N_2O_2] \neq [NO_2]$



rate of the foward rxn
= the rate of backward rxn.

$$N_2 + 2O_2 \rightarrow 2NO_2$$

$$K = \frac{[NO_2]^2}{[N_2][O_2]^2}$$