**Redox Reactions**

**Aim:** Identify reduction and oxidation and writing half reactions.

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**What is a redox reaction?**

A redox reaction, is a reaction in which one element is oxidized and another is reduced.

The electrons lost MUST equal the electrons gained. (Conservation of charge).

Oxidation - **when an element loses electrons and the oxidation # increases.**

Reduction - **when an element gains electrons and the oxidation # is reduced.**
A) \( \text{H}_2 + \text{Cl}_2 \rightarrow 2 \text{HCl} \)

1. Assign oxidation numbers to all the elements in the reaction.

2. The element that reduces in oxidation # was reduced (gained e⁻). The element that increases in oxidation # was oxidized (lost e⁻)

Ox: \( \text{H}_2 \rightarrow 2\text{e}⁻ + 2 \text{H}^{+1} \)

Red: \( \text{Cl}_2 + 2\text{e}⁻ \rightarrow 2 \text{Cl}^{-1} \)

2e⁻ lost = 2e⁻ gained

Conservation of charge

B) \( 2 \text{Al} + 3 \text{Cu}^{+2} \rightarrow 3 \text{Cu} + 2 \text{Al}^{+3} \)

3. When net ionic equations are given, just assign "0" to any free elements.

Ox: \( 2 (\text{Al}^{0} \rightarrow 3\text{e}⁻ + \text{Al}^{+3}) \)

Red: \( 3 (\text{Cu}^{+2} + 2\text{e}⁻ \rightarrow \text{Cu}^{0}) \)

6e⁻ lost = 6e⁻ gained

C) \( \text{K}_2\text{S} + 2 \text{HCl} \rightarrow 2 \text{KCl} + \text{H}_2\text{S} \)

4. If there is no change in oxidation # for any element, it is NOT REDOX.

• Double replacement reactions are NOT redox reactions.

No elements were oxidized or reduced so this is NOT a redox reaction.
Identify which elements are oxidized and which are reduced and write the half reaction. If nothing is oxidized or reduced it is NOT redox.

1) \[ \text{Cr}_2\text{O}_3 + \text{Al} \rightarrow \text{Cr} + \text{Al}_2\text{O}_3 \]

2) \[ \text{NaOH} + \text{HNO}_3 \rightarrow \text{NaNO}_3 + \text{H}_2\text{O} \]

3) \[ \text{Mg} + 2 \text{H}_2\text{O} \rightarrow \text{Mg(OH)}_2 + \text{H}_2 \]

4) \[ \text{CuS} + \text{HNO}_3 \rightarrow \text{CuSO}_4 + \text{NO (g)} + \text{H}_2\text{O} \]
Identify which elements are oxidized and which are reduced and write the half reaction. If nothing is oxidized or reduced it is NOT redox.

1) \(2 \text{Cu}(s) + \text{O}_2(g) \rightarrow 2 \text{CuO}\) 
2) \(2 \text{Mg} + \text{O}_2 \rightarrow 2 \text{MgO}\) 
3) \(\text{NaOH} + \text{KCl} \rightarrow \text{NaCl} + \text{KOH}\) 
4) \(\text{Zn} + 2 \text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2\) 
5) \(\text{Fe}_2\text{O}_3 + 3 \text{CO} \rightarrow 2 \text{Fe} + 3 \text{CO}_2\) 
6) \(2 \text{MgO} + 2 \text{F}_2 \rightarrow 2 \text{MgF}_2 + \text{O}_2\) 
7) \(2 \text{Na}_3\text{PO}_4 + 3 \text{K}_2\text{SO}_4 \rightarrow 3 \text{Na}_2\text{SO}_4 + 2 \text{K}_3\text{PO}_4\) 
8) \(2 \text{KClO}_3 \rightarrow 2 \text{KCl} + 3 \text{O}_2\) 
9) \(4 \text{NH}_3 + 5 \text{O}_2 \rightarrow 4 \text{NO} + 6 \text{H}_2\text{O}\) 
10) \(\text{SnCl}_2 + 2 \text{HgCl}_2 \rightarrow \text{SnCl}_4 + \text{Hg}_2\text{Cl}_2\)