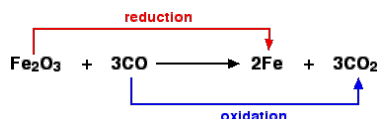


Understand that a disproportionation reaction involves an element in a single species being simultaneously oxidised and reduced:

Redox is when reduction and oxidation reactions take place together.

- WHEN IDENTIFYING WHETHER A REACTION IS REDOX MAKE SURE IT IS **BALANCED**.
- If the oxidation number decreases = **reduced**
- If the oxidation number increases = **oxidation**.

For example,



The oxidation state of;

- $\text{Fe}_2\text{O}_3 = +3 -2$
- $\text{CO} = +2 -2$
- $\text{Fe} = 0$
- $\text{CO}_2 = +4 -2$

The oxidation number of **Fe** **reduced** from +3 to 0.

The oxidation number of **C** **oxidised** from +2 to +4

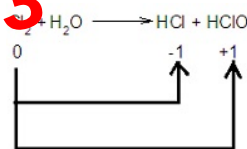
IN A REDOX REACTION ONE ELEMENT MUST REDUCE AND ONE MUST OXIDISE.

CO would thus be the **oxidising agent** and Fe_2O_3 would thus be the **reducing agent**

A **disproportionation reaction** is a reaction where the SAME element both **reduces and oxidises**.

E.g. $2\text{Cu}^+ \rightarrow \text{Cu}^{2+} + \text{Cu}$

Copper is both reduced and oxidised.



Chlorine water		
$\text{Cl}_2(\text{aq}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{HClO}(\text{aq}) + \text{HCl}(\text{aq})$		
0	+1	-1
0		
Chlorine with gold dilute sodium hydroxide		
$\text{Cl}_2(\text{aq}) + 2\text{NaOH}(\text{aq}) \rightarrow \text{NaCl}(\text{aq}) + \text{NaOCl}(\text{aq}) + \text{H}_2\text{O}(\text{l})$		
0	-1	+1
0		
Chlorine with hot concentrated sodium hydroxide		
$3\text{Cl}_2(\text{aq}) + 6\text{NaOH}(\text{aq}) \rightarrow 5\text{NaCl}(\text{aq}) + \text{NaClO}_3(\text{aq}) + 3\text{H}_2\text{O}(\text{l})$		
0	-1	+5
0		

Know that oxidation number is a useful concept in terms of the classification of reactions as redox and as **disproportionation**:

Understand that metals, in general, form positive ions by loss of electrons with an increase in oxidation number:

Understand that non-metals, in general, form negative ions by gain of electrons with a decrease in oxidation number:

To check whether something has reduced or oxidised you look at an elements oxidation number before and after a reaction.

- When an element is oxidised -> oxidation number increases for each electron lost.
- When an element is reduced -> oxidation number decreases for each electron gained

So, when the oxidation numbers for 2 elements increased and decrease = **redox reaction**

