

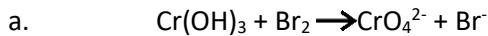
## Redox reactions – half equations to overall equations and overall to half

### Lesson 3

#### Revise writing balanced half equations

Every redox reaction consists of an oxidant and reductant pair that form their respective conjugates. Every time an oxidising agent gains electrons, it forms a reducing agent that could give electrons if the reaction were reversed, the same applies to reducing agents.

1. Write the balanced half equations for the following overall reactions taking place in an acidic solution.



Although states are important lets simplify things for the moment and ignore them.

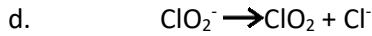
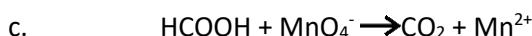
**Step 1 identify oxidant and reductant reactants and their conjugates using oxidation numbers. An oxidant has its oxidation number reduced while a reductant increases in oxidation number.**

Oxidant  $\text{Br}_2 \rightarrow \text{Br}$  ---- > Br goes from 0 to -1  
Reducant  $\text{Cr(OH)}_3 \rightarrow \text{CrO}_4^{2-}$  ----- > Cr goes from +3 to +6

**Step 2 Balance each half equation**

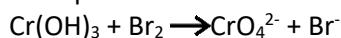
Oxidant  $2e + \text{Br}_2 \rightarrow 2\text{Br}$   
Reducant  $\text{H}_2\text{O} + \text{Cr(OH)}_3 \rightarrow \text{CrO}_4^{2-} + 5\text{H}^+ + 3e$

**Write balanced reduction and oxidation half equations for the reactions below.**



Write the balanced equation for the following reactions by first writing the oxidation and reduction half reactions and using these to write the overall reaction equation that occurs in an acidic environment except where stated.

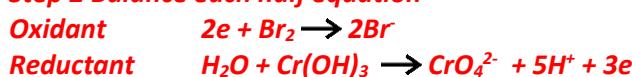
Example



**Step 1 identify oxidant and reductant reactants and their conjugates using oxidation numbers. An oxidant has its oxidation number reduced while a reductant increases in oxidation number.**



**Step 2 Balance each half equation**



**Step 3 eliminate the electrons by multiplying each equation so that there are 6 electrons in each.**



**Step 4 add the two equations and eliminate the electrons and cancel any other species that appears on both sides, such as H<sup>+</sup> or H<sub>2</sub>O. =>**



**Balance the equations below.**

