

Edexcel Chemistry A-level

Topic 3 - Redox I

Flashcards

This work by [PMT Education](https://www.pmt.education) is licensed under [CC BY-NC-ND 4.0](https://creativecommons.org/licenses/by-nc-nd/4.0/)



What is an oxidation number?



What is an oxidation number?

The number of electrons an atom uses to bond with any other atom



What is the oxidation number
of an uncombined element
such as C, H, O₂?



What is the oxidation number of an uncombined element such as C, H, O₂?

0



What is the oxidation number
of combined oxygen such as
in H_2O ?



What is the oxidation number of combined oxygen such as in H_2O ?

-2



What is the oxidation number of oxygen in peroxides?



What is the oxidation number of oxygen in peroxides?

-1



What is the oxidation number
of combined hydrogen such as
in NH_3 , H_2S ?



What is the oxidation number of combined hydrogen such as in NH_3 , H_2S ?

+1



What is the oxidation number of combined hydrogen in metal hydrides such as LiH ?



What is the oxidation number of hydrogen in metal hydrides such as LiH?

-1



What is the oxidation number
of a simple ion?



What is the oxidation number of a simple ion?

Charge on the ion

E.g $\text{Na}^+ \rightarrow +1$; $\text{Cl}^- \rightarrow -1$



What is the oxidation number
of combined fluorine such as
in NaF, CaF₂?



What is the oxidation number of combined fluorine such as in NaF, CaF₂?

-1



When an element has more than one stable oxidation number how is it indicated?



When an element has more than one stable oxidation number how is it indicated?

Written as a Roman numeral



What is the oxidation number
of Fe in iron (III) chloride?



What is the oxidation number of Fe in iron (III) chloride?

+3



What are oxyanions?



What are oxyanions?

Negative ions that have an element along with oxygen



What is the oxidation number
of S in SO_4^{2-} ?



What is the oxidation number of S in SO_4^{2-} ?

+6

Because, combined oxygen has an oxidation number of -2.

$$4 \times -2 = -8.$$

The charge on the compound is -2. Sum of oxidation numbers must equal -2

$$\text{So, } -2 - (-8) = +6$$



Define oxidation in terms of
electron transfer and oxidation
number



Define oxidation in terms of electron transfer and oxidation number

Oxidation is

- Loss of electrons
- An increase in oxidation number



Define reduction in terms of
electron transfer and oxidation
number



Define reduction in terms of electron transfer and oxidation number

Reduction is

- Gain of electrons
- A decrease in oxidation number



What is a redox reaction?



What is a redox reaction?

A reaction in which both oxidation and reduction takes place



What is the oxidation number of a metal?



What is the oxidation number of a metal?

0, because it is an uncombined element



What is an oxidising agent?



What is an oxidising agent?

Species that gains electrons.



What is a reducing agent?



What is a reducing agent?

Species that lose electrons.



What is the oxidation state
of chlorine in NaClO ?



What is the oxidation state of chlorine in NaClO ?

$$[\text{Cl}] = +1$$

(Otherwise $[\text{Cl}] = -1$ in most other compounds. NaClO is formed in a disproportionation reaction.)



Define the term
disproportionation?



Define the term disproportionation?

Where in a redox reaction, the **oxidation states** of atoms of the **same element**, **increase for some** atoms, whereas **decrease for some** atoms.

(e.g. See topic 2.3 - Group 7(17), the halogens for examples in Uses of Chlorine)



What is the oxidation state
of phosphorus in PCl_5 ?



What is the oxidation state of phosphorus in PCl_5 ?

$$[\text{P}] = +5$$



What is the oxidation state of nitrogen in ammonia?



What is the oxidation state of nitrogen in ammonia?

$$[N] = -3$$

(As ammonia is NH_3)



What is the oxidation state
of arsenic in AsO_4^{3-} ?



What is the oxidation state of arsenic in AsO_4^{-3} ?

$$[\text{As}] = +5$$



What is the oxidation state
of iron in $K_4Fe(CN)_6$?



What is the oxidation state of iron in $\text{K}_4\text{Fe}(\text{CN})_6$?

$$[\text{Fe}] = +2$$



Why is,
$$2\text{CrO}_4^{2-} + 2\text{H}^+ \rightarrow \text{Cr}_2\text{O}_7^{2-} + \text{H}_2\text{O},$$

not a redox reaction?

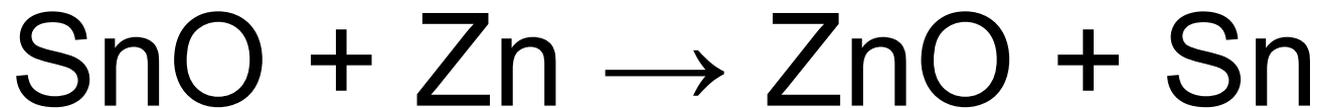


Why is, $2\text{CrO}_4^{2-} + 2\text{H}^+ \rightarrow \text{Cr}_2\text{O}_7^{2-} + \text{H}_2\text{O}$, **not** a redox reaction?

Chromium is oxidised whereas hydrogen remains the same oxidation state (no element is reduced).



What are the half equations
and the ionic equation for:



What are the half equations and the ionic equation for: $\text{SnO} + \text{Zn} \rightarrow \text{ZnO} + \text{Sn}$

Half Equations:

- $\text{Sn}^{2+} + 2\text{e}^- \rightarrow \text{Sn}$
- $\text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$

Ionic Equation:

- $\text{Sn}^{2+} + \text{Zn} \rightarrow \text{Sn} + \text{Zn}^{2+}$

