

AQA Chemistry A-level

Topic 1.7 - Oxidation, Reduction and Redox equations

Flashcards

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What is oxidation?



What is oxidation?

- **The loss of electrons**

OR

- Gain of Oxygen (or any electronegative element)

OR

- Loss of Hydrogen (or any electropositive element)



What is reduction?



What is reduction?

- **The gain of electrons**

OR

- Loss of Oxygen (or any electronegative element)

OR

- Gain of Hydrogen (or any electropositive element)



What is an oxidising agent?



What is an oxidising agent?

Species that gains electrons.



What is a reducing agent?

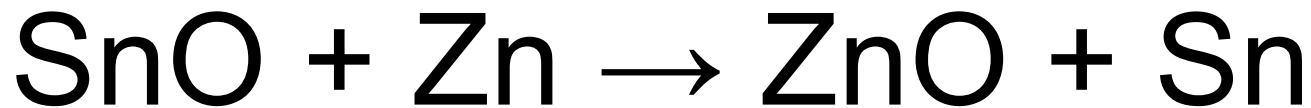


What is a reducing agent?

Species that lose electrons.



What 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:

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



Define oxidation state.



Define oxidation state.

A number which represents the number of electrons lost or gained by an atom of that element in the compound.

(If electrons are lost number is positive, if electrons are gained number is negative.)



What is the oxidation state of oxygen in OF_2 ?



What is the oxidation state of oxygen in OF_2 ?

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

(Otherwise $[\text{O}] = -2$ in most other compounds)



What is the oxidation state of hydrogen in KH ?



What is the oxidation state of hydrogen in KH ?

$$[\text{H}] = -1$$

([H] = -1 is for metal hydrides. Otherwise [H] = +1 in most other compounds)



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 $\text{K}_4\text{Fe}(\text{CN})_6$?



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

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



Why is $1s^2 2s^2 2p^5$ a weaker reducing agent than $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$?



Why is $1s^2 2s^2 2p^5$ a weaker reducing agent than $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$?

The 2p electron is closer to the nucleus (**smaller atom**) than the 4s electron. Hence the **nuclear attraction is stronger** so the 2p **electron is lost less easily** than the 4s electron.



What happens in a redox reaction.



What happens in a redox reaction.

- Electrons are transferred from one species (element) to another.
- One element is oxidised whilst another is reduced.



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).

