# Edexcel International Chemistry A Level

## CP 13 - Carry out redox titrations with:
## i. iron(II) ions and potassium manganate(VII)
## ii. sodium thiosulfate and iodine
## (A level only)

Flashcards

What is meant by the terms reduction and oxidation in terms of electrons?

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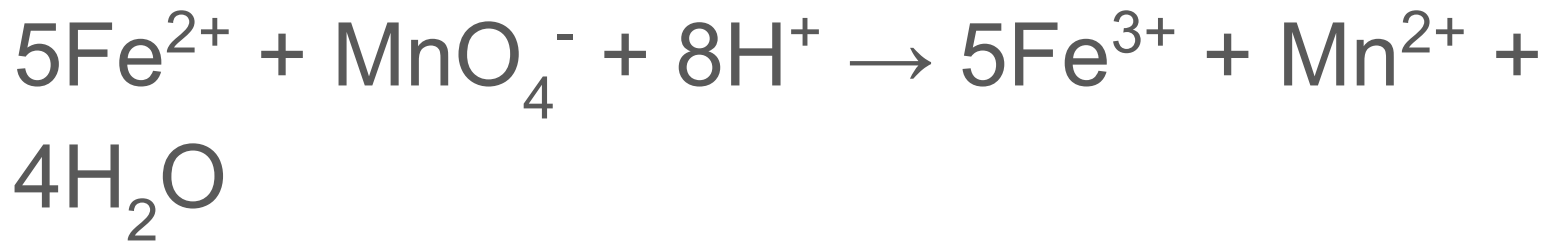
Oxidation - loss of electrons

Reduction - gain of electrons

Write an equation for the oxidation of iron(II) ions with $MnO_4^-$ ions

Write an equation for the oxidation of iron(II) ions with $MnO_4^-$ ions

$$5Fe^{2+} + MnO_4^- + 8H^+ \rightarrow 5Fe^{3+} + Mn^{2+} + 4H_2O$$

When carrying out a titration between iron(II) ions and potassium manganate, why is an indicator not needed?

When carrying out a titration between iron(II) ions and potassium manganate, why is an indicator not needed?

KMnO$_4$ is self indicating. When MnO$_4^-$ ions are reduced to Mn$^{2+}$, there is a colour change from purple to colourless (or very, very pale pink). The end point of the titration is when the solution fist permanently becomes pale pink as the MnO$_4^-$ ions are first in excess.

When carrying out a titration between iron(II) ions and potassium manganate, why must the conditions be acidic?

When carrying out a titration between iron(II) ions and potassium manganate, why must the conditions be acidic?

So there is a supply of hydrogen ions for the reaction

Why isn't solid potassium manganate suitable as a primary standard?

Why isn't solid potassium manganate suitable as a primary standard?

Because it doesn't form a stable solution. Some $MnO_4^-$ will react with water to form $MnO_2$.

# Why isn't hydrated iron(II) sulfate suitable as a primary standard?

Why isn't hydrated iron(II) sulfate suitable as a primary standard?

Because iron(II) ions react with oxygen in air to become iron(III) ions.

Why is a volumetric pipette used to measure the volume of iron(II) solution into the conical flask before a titration?

Why is a volumetric pipette used to measure the volume of iron(II) solution into the conical flask before a titration?

A volumetric pipette is more accurate than a measuring cylinder

Write an equation for the reduction of iodide ions using sodium thiosulfate

Write an equation for the reduction of iodide ions using sodium thiosulfate

$$2S_2O_3^{2-} + I_2 \rightarrow S_4O_6^{2-} + 2I^-$$

To what degree of accuracy should all burette readings be given to?

To what degree of accuracy should all burette readings be given to?

The nearest 0.05cm$^3$

# What is the end-point of a titration?

What is the end-point of a titration?

The first point at which there is a permanent colour change

# What results are used when calculating a mean titre?

What results are used when calculating a mean titre?

Concordant results (within 0.1cm$^3$ of each other)

# Why shouldn't the rough trial be used when calculating the mean titre?

# Why shouldn't the rough trial be used when calculating the mean titre?

It is not accurate enough

Describe how to conduct a titration between a solution iron(II) ions and a solution of potassium manganate

# Describe how to conduct a titration between a solution iron(II) ions and a solution of potassium manganate

1. Use a pipette to add 25 cm$^3$ of Fe$^{2+}$(aq) to a conical flask.
2. Pour potassium manganate solution into the burette using a funnel. Record the initial burette volume.
3. Complete a trial titre. The conical flask should be swirled constantly above a white tile. Stop adding the potassium manganate as soon as the end point is reached. Record the final burette volume and calculate the titre volume.
4. Repeat the titration until two concordant results are obtained. Add potassium manganate drop by drop near the end point.

# Why is the conical flask swirled during a titration?

Why is the conical flask swirled during a titration?

To ensure all the reactants are combined so that the reaction is complete

Why is it better to have a titre volume of 25 cm$^3$ than 10 cm$^3$?

Why is it better to have a titre volume of 25 cm$^3$ than 10 cm$^3$?

The larger the titre volume, the smaller the percentage error

# Why is a white tile used during a titration?

Why is a white tile used during a titration?

To make the colour change easier to observe

# How is a redox titration different to an acid-alkali titration?

How is a redox titration different to an acid-alkali titration?

During an acid-alkali titration, a neutralisation reaction occurs to produce water and a salt. In a redox titration, oxidation and reduction reactions occur.

# What equation links number of moles and concentration?

What equation links number of moles and concentration?

Number of moles = concentration x volume

n = C x V

# What equation links number of moles and mass?

What equation links number of moles and mass?

Number of moles = mass ÷ molar mass

$n = m/M$

What colour change occurs at the end point of a titration between iodine and sodium thiosulfate?

What colour change occurs at the end point of a titration between iodine and sodium thiosulfate?

Colour change from golden-brown to colourless when sodium thiosulfate is added to a flask of iodine. If starch is added as an indicator, the solution will change from blue-black to colourless.