

OCR Chemistry A-Level

PAG 12 - Research skills

Investigating iron tablets

(A level only)

Flashcards

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What is a prediction using scientific knowledge called?



What is a prediction using scientific knowledge called?

Hypothesis



What is meant by the term accuracy?



What is meant by the term accuracy?

How close the measurement is to the true value



What are variables?



What are variables?

Factors that can affect the outcome of the experiment



What is an independent variable?



What is an independent variable?

A factor that is changed during the experiment to see the effect it has on another factor.



What is a dependent variable?



What is a dependent variable?

A factor that is measured or observed in the experiment.



What is a control variable?



What is a control variable?

A factor that is kept constant throughout the experiment.



What is oxidation?



What is oxidation?

The loss of electrons or increase in oxidation state



What is reduction?



What is reduction?

The gain of electrons or decrease in oxidation state



What is a redox reaction?



What is a redox reaction?

A reaction in which some atoms are oxidised and others are reduced



How can the percentage of iron in iron tablets be found?



How can the percentage of iron in iron tablets be found?

1. Prepare a standard solution of iron (II) using the tablets and sulfuric acid
2. Titrate a set volume of this iron(II) solution against a solution of KMnO_4
3. Repeat until you obtain concordant results and calculate a mean titre
4. Calculate the number of moles of KMnO_4 that reacted
5. Use the ratio in the chemical equation to calculate the number of moles of iron that reacted
6. Calculate the percentage mass of iron using the mass present in the standard solution



Describe how to make a standard solution of acidified iron(II) sulfate



Describe how to make a standard solution of acidified iron(II) sulfate

1. Grind up some iron tablets. Measure the total mass of the iron tablets in a weighing boat.
2. Add the powdered tablets to a conical flask and reweigh the weighing boat. The difference between the masses is the mass of iron tablets in the solution.
3. Add a 50cm^3 of sulfuric acid to the conical flask to dissolve the iron. Stopper the flask and shake well. Leave the flask for the residue to settle.
4. Filter the solution into a volumetric flask without disturbing the residue. Rinse the filter paper with a small volume of distilled water.
5. Fill the volumetric flask up to the graduation mark with sulfuric acid then stopper and invert the flask to mix.



Write an equation for the redox reaction between iron(II) ions and manganate(VII) ions



rite an equation for the redox reaction between iron(II) ions and manganate(VII) ions



When making a standard solution, what method should be used to find the mass of solute?



When making a standard solution, what method should be used to find the mass of solute?

Weighing-by-difference method



Why is an indicator not required in the titration between Fe^{2+} and MnO_4^- ?



Why is an indicator not required in the titration between Fe^{2+} and MnO_4^- ?

KMnO_4 is self indicating; the end point is when you get the first permanent pale pink colour.



In a titration, what are concordant results?



In a titration, what are concordant results?

Titres that are within 0.1 cm^3 of each other.



Give 3 possible sources of error in this experiment



Give 3 possible sources of error in this experiment

- The iron may not completely dissolve - warming may help
- Some iron may not be transferred between containers - take washings
- The end point may be hard to see - place a white tile underneath the conical flask to make the colour change easier to observe



What equation links concentration, moles
and volume?



What equation links concentration, moles and volume?

Moles = volume x concentration

$$n = V \times C$$



What equation links mass, molecular mass and number of moles?



What equation links mass, molecular mass and number of moles?

Mass (g) = molecular mass x mole

$$m = M \times n$$



What is primary research?



What is primary research?

A new set of data that has been collected. Conclusions are drawn from this new data.



Give two examples of primary research



Give two examples of primary research

Surveys

Experiments



What is secondary research?



What is secondary research?

Data from other studies that are used to draw conclusions



What is the difference between qualitative and quantitative data?



What is the difference between qualitative and quantitative data?

Qualitative - descriptions of observations

Quantitative - numerical data



Online and offline resources can be used
for what?



Online and offline resources can be used for what?

Research



Describe the Vancouver referencing system



Describe the Vancouver referencing system

Full references are numbered at the end of a document (with numbers linked to the appropriate reference in they order they appear in the text).

E.g. 1. Author (year of publication), title

Other information such as the page number, volume/ issue number, web address or date of access (online only) may also need to be recorded.



Describe the Parenthetical (Harvard) referencing system



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The authors name and the date of the work are put in brackets at an appropriate point in the text

E.g. Universal indicator can be used to measure pH (author, date).

The references are listed at the end of the document in alphabetical order without numbers. If there are more than 3 authors, write the first name followed by 'et al.'



What is the general reference format for books?



What is the general reference format for books?

Author (year), *Title*, edition (if relevant),
publisher's location, publisher



What is the general reference format for journal articles?



What is the general reference format for journal articles?

Author (year), 'Article title', *Journal title*,
volume number, issue number, pp.

XXX-XXX

(where pp. xxx-xxx is the range of pages)



What is the general reference format for websites?



What is the general reference format for websites?

Author (year), *Title*. [online] Last accessed date: URL

If the author is not listed on the webpage, name the organisation

