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Level 1 Chemistry, 2015

90934 Demonstrate understanding of aspects of chemical reactions

9.30 a.m. Tuesday 24 November 2015
Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of aspects of chemical reactions.	Demonstrate in-depth understanding of aspects of chemical reactions.	Demonstrate comprehensive understanding of aspects of chemical reactions.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL the questions in this booklet.

A periodic table and other reference material are provided in the Resource Booklet L1–CHEMR.

If you need more room for any answer, use the extra space provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–11 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

Not Achieved

TOTAL 5

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QUESTION ONE

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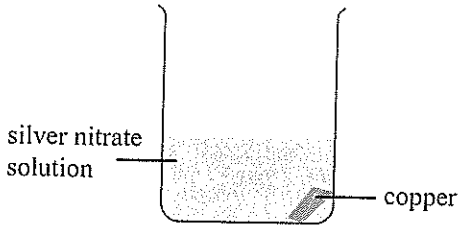
(a) A piece of copper was added to a solution of silver nitrate in a beaker, and left for one day.



(i) Identify the type of reaction occurring in the beaker.

displacement reaction.

(ii) Describe the observations occurring, and link them to the reactants and products involved.

When the copper (pinky metal) is added to the ~~reactants~~ silver nitrate solution then no reaction occurs because silver is more reactive than copper so the copper can't kick the silver out.

(iii) Write a balanced ionic equation for the reaction occurring in the beaker.

$AgNO_3 + Cu \longrightarrow$ NO reaction.

(b) A strip of silver-grey metal is known to be either **silver** or **magnesium**.

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Explain how the identity of the metal could be determined by adding **copper sulfate** solution to the strip of metal, and leaving it for one day.

In your answer, you should:

- give any observations you would expect to see if the metal is:
  - silver, and
  - magnesium,

  and link them to the relevant species present
- explain why a chemical reaction may or may not occur, depending on whether the metal is silver or magnesium.

If the metal is silver then you should see fizzing, heat given off and the metal begining to dissolve because of the silver being more reactive then copper on the activity series so the new solution should be silver sulfate. As for magnesium which is less reactive than copper sulfate nothing would happen because nothing can happen. So if you left them for a day you would be able to tell which is silver and which is magnesium because the silver metal would be gone as it would have dissolved into the solution. //

This evidence has confused the displacement reaction by interpreting the activity series incorrectly.

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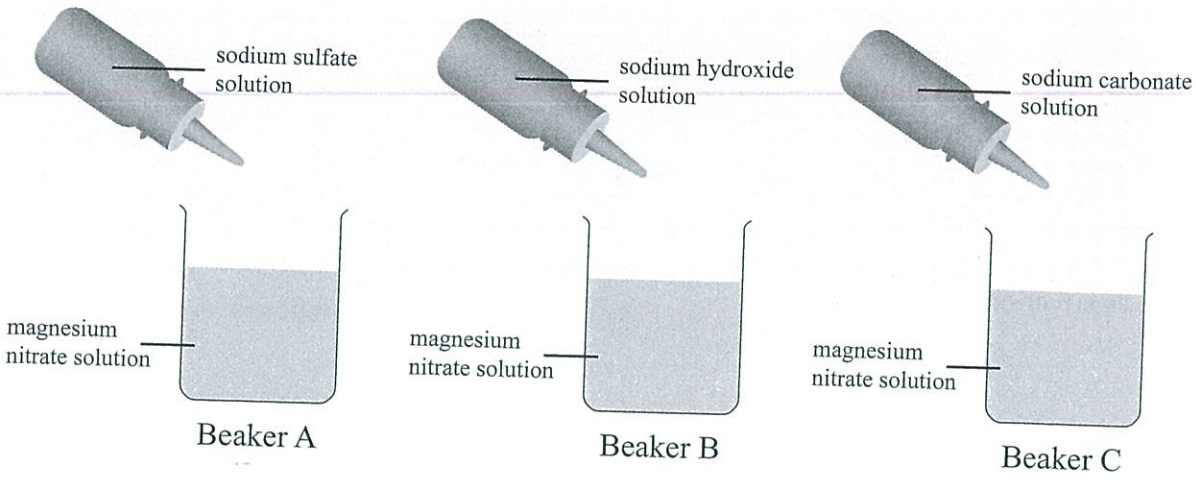
QUESTION TWO

(a) Three different solutions were added to separate beakers containing a solution of magnesium nitrate. Only two of the mixtures produced precipitates.



Complete the table below by identifying:

- whether a precipitate forms
- the name of any precipitate that may have formed in the beakers.

You may use the solubility rules provided in the resource booklet.

	Precipitate forms? Yes / No	**Name of precipitate**
Beaker A	NO	—
Beaker B	yes	Magnesium hydroxide
Beaker C	yes	Magnesium carbonate

(b) (i) Iron(II) sulfate solution and sodium hydroxide solution react to form a precipitate.

Complete the following ionic equation to show the formation of the precipitate.

$Fe^{2+} + OH^- \rightarrow$ FeCOH)$_2$ ~~CO_2~~

(ii) Elaborate on the reaction occurring in (b)(i).

In your answer, you should:

- explain why the reaction is classified as a precipitation reaction by referring to the ions in both solutions and the precipitate formed
- describe any observations that would be seen, and link them to the reactants and products involved.

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Because the percipitate is insoluble and will end up settling at the bottom of the beaker. You should be able to see a white percipitate form for both magnesium reactions and a green percipitate form for the Iron(II) reaction. //

evidence showing understanding of what a precipitate is.

(c) A sample of water is required to be tested for the presence of calcium ions and silver ions. It is known that the sample of water does not contain any other positive ions / cations.

Explain how the sample of water could be tested to show whether or not it contains calcium ions, or silver ions, or both.

In your answer, you should:

- write a method that could be carried out in a school laboratory
- name any chemicals you would use
- identify any precipitates formed and link these to any observations that would be made
- explain how the results are used to determine which ions are present or absent.

You should use the solubility rules provided in the resource booklet.

You could test if the water has any other chemicals present by using ~~universal indicator~~ ~~thread~~ paper if the solution turns green it is neutral (water) if it turns blue then there is a base present and if it turns red then an acid is present //

no evidence in this section

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QUESTION THREE

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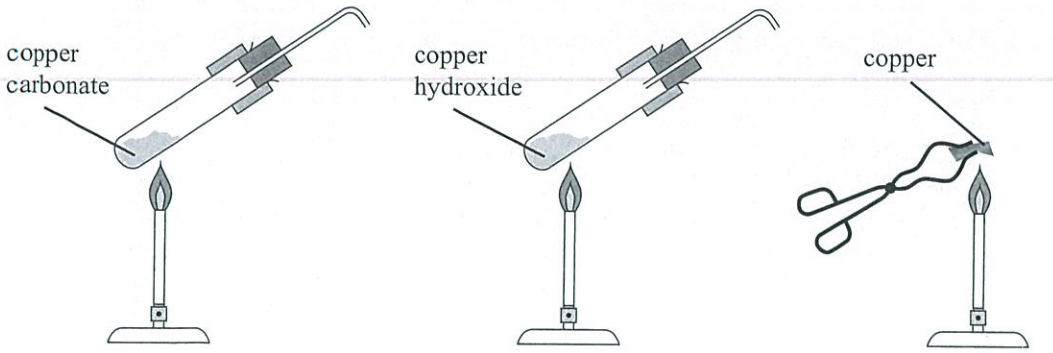
A student made samples of copper oxide using three different methods in a school laboratory.



Reaction 1 **Reaction 2** **Reaction 3**

(a) (i) Identify the type of reaction occurring in each experiment.

Reaction 1: ~~exchange~~ displacement

Reaction 2: ~~Precipitation displacement~~ exchange.

Reaction 3: Combination

(ii) Describe any observations that would be made during each experiment, and link them to the reactants and products involved.

Reaction 1: The green copper carbonate will turn black and an carbon dioxide would be produced. //

Reaction 2: The white percipitate will stay the same and a gas will be produced either hydrogen or carbon dioxide /

Reaction 3: The copper metal which is a pinky colour will form a black ash / film around itself this being copper oxide. //

evidence of observations in a reaction

(b) Explain how the student could identify ONE of the products for each of reactions 1 and 2.

Understands tests for products.

Reaction 1: If carbon dioxide is present then the colourless solution lime water will turn cloudy / milky this is when you know CO_2 is present

Reaction 2: To know if hydrogen is present then you gather a sample of the gas being released in a test tube then you light a splint and put it in the test tube and if you hear a pop then you know that hydrogen is present.

(c) Compare and contrast the three reactions in part (a) on the previous page.

In your answer, you should:

- write word and balanced symbol equations for all three reactions in the boxes provided below
- explain what is occurring during each of the different reactions
- where relevant, explain the reaction(s) in terms of electron transfer.

Reaction 1

Word equation:

copper carbonate + oxygen → copper oxide + carbon dioxide

Balanced symbol equation:

$CuCO_3 + O_2 \rightarrow CuO + CO_2$

Reaction 2

Word equation:

$Cu(OH)_2 + O_2 \rightarrow CuO + H_2$

Balanced symbol equation:

copper hydroxide + oxygen → copper oxide + hydrogen

Reaction 3

Word equation:

copper + oxygen → copper oxide

Balanced symbol equation:

$Cu + O_2 \rightarrow / CuO$

Not enough evidence in equation to demonstrate understanding

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