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SUPERVISOR'S USE ONLY

Level 1 Chemistry, 2016

90934 Demonstrate understanding of aspects of chemical reactions

2.00 p.m. Monday 21 November 2016
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 2–8 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.

Achievement

TOTAL

11

ASSESSOR'S USE ONLY

QUESTION ONE

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- (a) Name the precipitate that is formed when the following solutions are mixed together.

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

- (i) Zinc nitrate and sodium carbonate

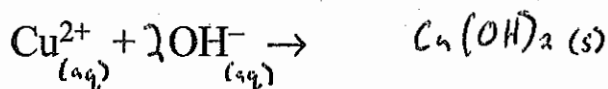
Zinc Carbonate

- (ii) Barium chloride and sodium sulfate

Barium Sulfate

- (b) (i) Copper sulfate solution and sodium hydroxide solution react to form a precipitate.

Complete the following equation showing the formation of the precipitate.



- (ii) Why is this reaction classified as a precipitation reaction?

because a precipitation reaction is when an anion and cation react to form an insoluble solid.

- (iii) Describe any observations that would be seen during this reaction, and link these to the reactants and products.

Copper sulfate is a clear blue solution and sodium hydroxide is a colourless solution. The precipitate formed is a blue solid.

- (c) A solution is known to contain zinc ions OR lead ions.

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How could a piece of iron metal, and a solution of sodium chloride, each be used to decide the identity of the metal?

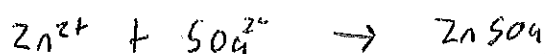
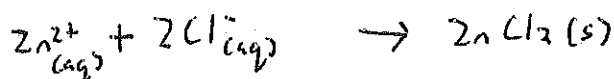
In your answer, you should:

- for each test, write a method that could be carried out in a school laboratory
- describe any observations and link them to the reactants and products involved
- write balanced ionic equations for any reactions that occur.

~~If the sodium~~ If zinc were to come into contact with the sodium chloride ^{solution} it would become a precipitate (a solid) appeared to it lead were to come into contact with the sodium chloride solution no precipitate would form. As for the iron metal if it were a molecule with ^{SO₄} it would be able to test for the strength of reactivity to determine the metal. As Zn is more reactive than Fe it would displace Fe forming a molecule with ^{SO₄} and if the metal was lead it would be less reactive than Fe meaning no displacement would occur. With this knowledge I am able to determine which metal is contained in the solution. Fe is a silver metal, Zinc a silvery metal and, lead black and sodium chloride a colourless solution, a white pre would form if Zinc and sodium chloride reacted.

Balanced ionic equations:

Ionic equation of Zinc and Chloride



A3

QUESTION TWO

- (a) Iron can be reacted with sulfur when a mixture of powdered iron and powdered sulfur is heated in a test tube.

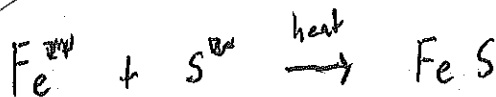
- (i) What type of reaction occurs?

Combination

- (ii) Describe any observations that would be seen during this reaction, and link these to the reactants and products.

Iron is silvery white powder and sulfur is a yellow powder. The product formed is Iron Sulfide a orange black product.

- (iii) Write a balanced symbol equation for the reaction occurring.



- (b) When magnesium is heated with oxygen, a bright light is produced and a white-grey solid forms (**Reaction 1**).

When magnesium metal is added to a solution of copper sulfate, the blue colour of the solution fades and a pinky-brown solid forms (**Reaction 2**).

What are the similarities and differences between **Reaction 1** and **Reaction 2**?

In your answer, you should include:

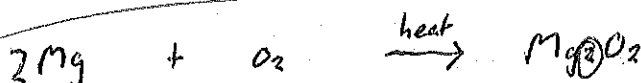
- the types of reactions occurring
- reference to electron transfer, where appropriate
- word equations for the reactions occurring.

Reaction 1 is a combination reaction. The silvery magnesium reacts with the oxygen a colourless, odourless gas in heat to form Magnesium oxide a white ash. Oxygen has 2 extra electrons to complete its outer valence shell while Magnesium lost 2 electrons to gain a complete outer valence shell. Needing to become neutral oxygen and magnesium react to form Magnesium oxide where Mg's lost

in electrons is paired to oxygens increase in electrons.

Reaction 2: is a displacement reaction. Due to Mg being more reactive than Cu, Mg reacted with CuSO_4 to create the product MgSO_4 . Cu ~~lost~~ gained 2 electrons and became a neutral atom in this process and Mg ~~gained~~ lost 2 electrons which it transferred to Cu during the displacement reaction. Mg is a silver metal, has had 2 electrons ~~transferred~~ transferred to Cu and has become an ion with a positive charge of 2 meaning Cu Mg has 2 more protons than electrons. In the beginning of the reaction Mg was a (silver) metal and copper sulfate a blue solution during the experiment as more pinkish brown Cu began depositing on the Mg the colour of the copper sulfate began to become more colourless as the Cu ions separated from the sulfate.

Word equation for Reaction 1:



Word equation for Reaction 2:



QUESTION THREE

ASSESSOR
USE ONLY

- (a) A small amount of solid manganese dioxide is added to a test tube of freshly prepared hydrogen peroxide solution.

(i) What observations would be made?

Explain your answer by linking any observations to the reactants and products involved.

The manganese dioxide would remain the same mass. But the hydrogen peroxide would decrease mass as hydrogen gas formed as well as some water vapour. Water could be tested if it were present via using the cobalt paper test blue cobalt paper turns pink in the presence of water.

(ii) What type of reaction is occurring?

Explain your answer.

A catalytic decomposition reaction is occurring where manganese dioxide is being used as a catalyst to separate hydrogen peroxide into water molecules and hydrogen gas.

- (b) Three white solids are known to be lead hydroxide, sodium hydrogen carbonate, and calcium carbonate.

How could the three solids be identified using decomposition reactions?

Support your answer with balanced symbol equations.

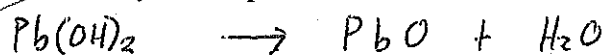
Due to heat once lead hydroxide has decomposed using calcium cobalt paper I am able to test for water, as lead hydroxide is the only decomposition to produce water. If the test is successful then the white powder is lead hydroxide, to be sure when the blue cobalt paper is in the presence of water it turns pink.

To test for Sodium hydroxide the lime water test can be used. As a product from the decomposition of Sodium hydrogen carbonate, Carbon dioxide will make lime water turn milky in the presence

of Carbon dioxide.

Calcium Carbonate can also be tested via the same method (the lime water test) where the limewater turns milky in the presence of carbon dioxide, as Carbon dioxide is a product from CaCO_3 .

Balanced symbol equations:



Annotated Exemplar Template

Achievement Exemplar 2016

Subject:	Chemistry	Standard:	90934	Total score:	11
Q	Grade score	Annotation			
1	A3	<p>The candidate gained full credit for parts (a) and (b)(i) and (ii). Credit was lost in part (b)(iii) as the candidate did not identify the blue solid and did not identify the colourless solution as sodium sulfate.</p> <p>Unfortunately, the candidate did not gain any credit for part (c). The candidate was confused with the solubility rules and mixed up what was reacting with what. Equations written had nothing to do with the actual reactions being asked.</p> <p>Stating that a metal like iron is a 'silver metal' when describing the physical appearance of the metal, is unacceptable, as silver is an element.</p>			
2	E7	<p>The candidate gained full credit for part (a).</p> <p>In part (b), the candidate correctly identifies the combination reaction, but did not state why it is classified as such. Also incorrectly describes a displacement reaction.</p> <p>The candidate did give a very good account of electron transfer and a correct equation for reaction 2.</p>			
3	N1	<p>In part (a)(i), the candidate did not link any observations to either reactants or products. In part (a)(ii), the wrong gas is given. The candidate needed to explain both decomposition and catalyst with the correct products that formed.</p> <p>In part (b), the candidate correctly identifies a test for both water and CO₂. The candidate incorrectly state that Pb(OH)₂ is the only reactant to produce water. This means that only one powder was positively identified. An incorrect equation was given for NaHCO₃.</p>			