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90171

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

Level 1 Chemistry, 2006

90171 Describe chemical reactions

Credits: Four
9.30 am Monday 27 November 2006

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 answer ALL the questions in this booklet.

A metal activity series, solubility rules, a table of ions and a periodic table are provided in Resource Booklet L1–CHEMR.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–7 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.

For Assessor's use only	**Achievement Criteria**		
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Describe chemical reactions. ☐	Interpret information about chemical reactions. ☐	Apply understanding of chemical reactions. ☐
Overall Level of Performance ☐		

You are advised to spend 40 minutes answering the questions in this booklet.

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QUESTION ONE: TYPES OF REACTION

Classify **each** of the reactions in the table below by writing the letter from the **key list** in the space provided.

Key list: oxidation-reduction – **O**
precipitation – **P**
thermal decomposition – **T**

		Type of reaction (Choose from O, P or T)
(a)	$CaCl_2(aq) + K_2CO_3(aq) \rightarrow 2KCl(aq) + CaCO_3(s)$	
(b)	$Pb(OH)_2(s) \rightarrow PbO(s) + H_2O(\ell)$	
(c)	$AgNO_3(aq) + NaCl(aq) \rightarrow NaNO_3(aq) + AgCl(s)$	
(d)	$Cl_2(aq) + 2I^-(aq) \rightarrow 2Cl^-(aq) + I_2(aq)$	
(e)	$CO(g) + PbO(s) \rightarrow Pb(s) + CO_2(g)$	

QUESTION TWO: PRECIPITATION

The following solutions are mixed in the pairs shown. Use the solubility rules in your Resource Booklet to identify the **precipitate** (if any) that is formed for each pair.

(a) Write the **name of the precipitate** or, if none is formed, write **no precipitate.**

	Solutions that are mixed	**Name of precipitate, or no precipitate**
(i)	Sodium chloride and copper nitrate	
(ii)	Lead nitrate and potassium chloride	
(iii)	Potassium hydroxide and magnesium sulfate	

(b) Write a balanced equation for the formation of ONE precipitate identified in Question Two (a) above. Spectator ions may be omitted from ionic equations.

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QUESTION THREE: WORD EQUATIONS

Complete the following word equations.

(a) barium chloride + magnesium sulfate → _____ + _____

(b) sodium hydrogen carbonate $\xrightarrow{\text{heat}}$ _____ + _____ + _____

(c) iron + copper sulfate → _____ + _____

QUESTION FOUR: OBSERVING REACTIONS

A group of students carried out an investigation into the thermal decomposition of the following solid carbonates: sodium carbonate, calcium carbonate, and copper carbonate.

(a) Describe the appearance of each carbonate before it was heated.

	Carbonate	**Initial Observation (before heating)**
(i)	Sodium carbonate	
(ii)	Calcium carbonate	
(iii)	Copper carbonate	

(b) Describe the observations the students would have made when heating each of the carbonates.

	Carbonate	**Observations made during heating**
(i)	Sodium carbonate	
(ii)	Calcium carbonate	
(iii)	Copper carbonate	

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(c) Write a balanced equation for the thermal decomposition of copper carbonate.

Some grey powdered magnesium was added to a green solution of iron(II) sulfate in a beaker, and mixed well. The green colour of the solution faded and the grey powder disappeared. A new dark grey solid formed on the bottom of the beaker.

(d) (i) State what type of reaction this is.

(ii) Discuss what happened in this reaction. Your answer should link the reactants and products involved in the reaction to the observations made.

Include an appropriate balanced equation in your answer. Spectator ions may be omitted.

QUESTION FIVE: CALCULATING MOLAR MASSES

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Calculate the molar masses of the following compounds.

Refer to the Resource Booklet provided. Show your working.

(a) $CaCO_3$

(b) Al_2O_3

(c) $(NH_4)_2SO_4$

QUESTION SIX: CALCULATING MASS

Ammonia, NH_3, can be prepared by heating ammonium chloride, NH_4Cl, with calcium hydroxide, $Ca(OH)_2$.

$$2NH_4Cl + Ca(OH)_2 \rightarrow CaCl_2 + 2NH_3 + 2H_2O$$

Calculate the **mass** of calcium hydroxide required to react with 2.14 grams of ammonium chloride.

Refer to the Resource Booklet provided. Show your working.

QUESTION SEVEN: DETERMINING A FORMULA

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Determine the formula of the compound made when 3.55 g of chlorine combines with 5.60 g of oxygen.

The molar mass of the compound is 183.0.

Refer to the Resource Booklet provided. Show your working.

Extra paper for continuation of answers if required.
Clearly number the question.

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Question number	