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90944



NEW ZEALAND QUALIFICATIONS AUTHORITY
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SUPERVISOR'S USE ONLY

Level 1 Science, 2019

90944 Demonstrate understanding of aspects of acids and bases

9.30 a.m. Thursday 14 November 2019
Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of aspects of acids and bases.	Demonstrate in-depth understanding of aspects of acids and bases.	Demonstrate comprehensive understanding of aspects of acids and bases.

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.

Pull out Resource Booklet 90944R from the centre of this booklet.

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.

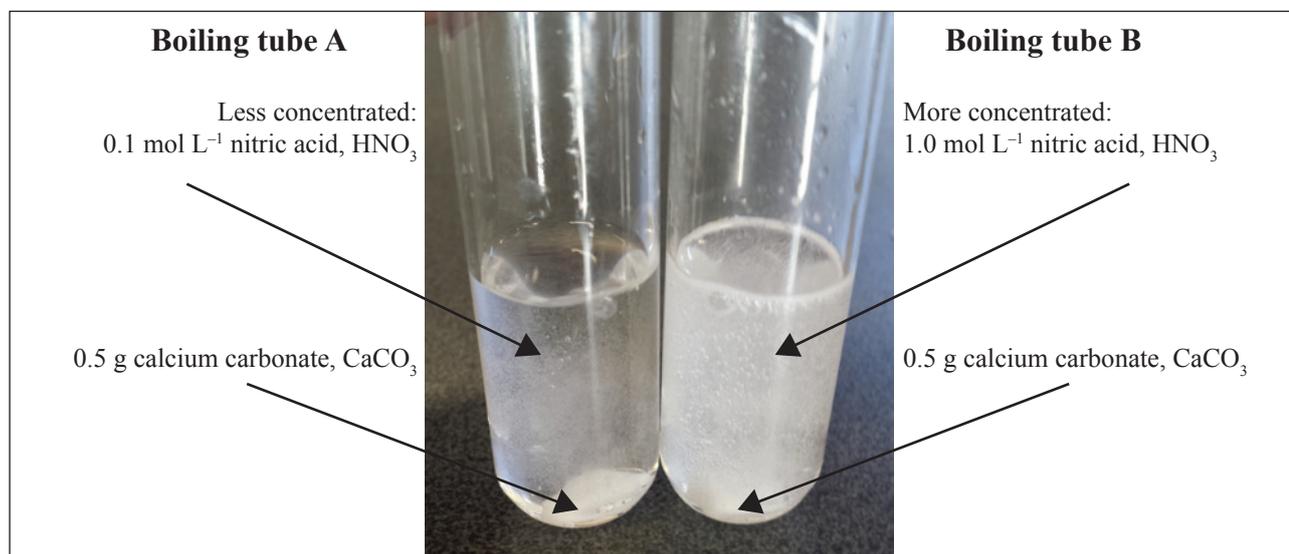
TOTAL

ASSESSOR'S USE ONLY

QUESTION ONE

Two boiling tubes both contain 10 mL of nitric acid, HNO_3 . Boiling tube A contains a 0.1 mol L^{-1} solution of nitric acid and boiling tube B contains a more concentrated 1.0 mol L^{-1} solution of nitric acid. A piece of marble chip (calcium carbonate, CaCO_3) with a mass of 0.5 g is added to each boiling tube and the reaction is observed and photographed.

The temperature of the acid in both boiling tubes is 20°C .



- (a) Write the word equation AND the balanced symbol equation for the reaction between the nitric acid and calcium carbonate.

Word equation

Balanced symbol equation

- (b) Explain the effect of using a higher concentration of nitric acid on the **rate** of this reaction, compared to using a lower concentration of acid.

Your answer should refer to particle collisions.

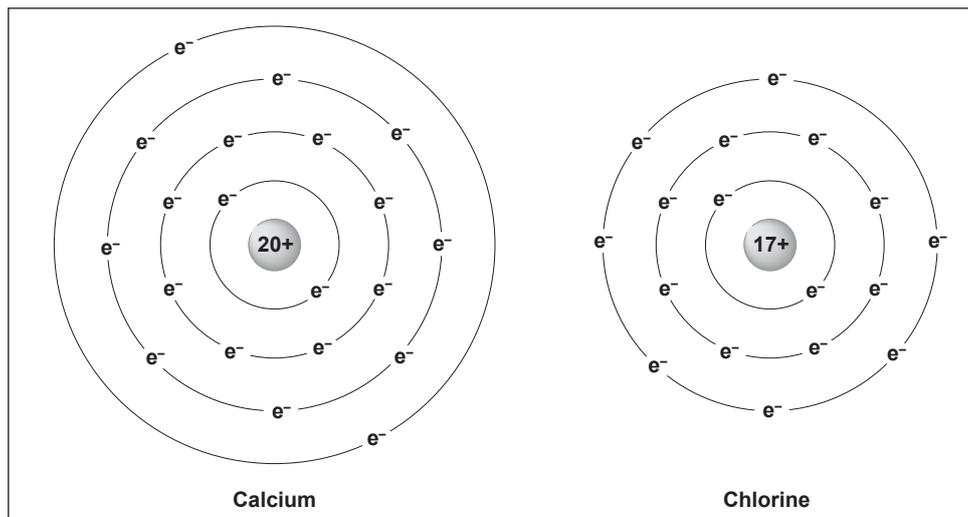
- (c) In a second investigation, two different boiling tubes each contain 10 mL of the same concentration 1 mol L^{-1} nitric acid, HNO_3 . The nitric acid in boiling tube A is at 20°C and the nitric acid in boiling tube B is at 40°C . A piece of marble chip (calcium carbonate, CaCO_3) with a mass of 0.5 g is added to each boiling tube, and the reaction is observed.

Explain the effect of increasing the temperature of the nitric acid from 20°C to 40°C on the **rate** of reaction.

Your answer should refer to particle collisions.

QUESTION TWO

The diagram shows models of two atoms.



- (a) Write the electronic arrangement of the two atoms.

Calcium atom, Ca: _____

Chlorine atom, Cl: _____

- (b) Calcium and chlorine atoms both form ions with the same **electron arrangement**.

- (i) Write the electronic arrangement of the two ions.

Calcium ion, Ca^{2+} : _____

Chloride ion, Cl^- : _____

- (ii) Explain how each ion, Ca^{2+} and Cl^- , is formed.

In your answer you should:

- explain why these elements form ions
- explain the charges on both **ions** in terms of electron arrangement of atoms and ions, number of protons and number of electrons, and charge.

Calcium ion, Ca^{2+} : _____

(b) In an investigation, copper sulfate can be made by reacting solid copper carbonate with sulfuric acid, H_2SO_4 .

(i) Name the type of reaction occurring.

(ii) Write the word and the balanced symbol equation for this reaction.

Word equation

Balanced symbol equation

(iii) Describe how you could make **solid** copper sulfate crystals in a school laboratory. In your answer, include how you would know the reaction had been completed.
