

91390



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NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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SUPERVISOR'S USE ONLY

Level 3 Chemistry, 2014

91390 Demonstrate understanding of thermochemical principles and the properties of particles and substances

2.00 pm Tuesday 11 November 2014

Credits: Five

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of thermochemical principles and the properties of particles and substances.	Demonstrate in-depth understanding of thermochemical principles and the properties of particles and substances.	Demonstrate comprehensive understanding of thermochemical principles and the properties of particles and substances.

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 is provided on the Resource Sheet L3-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 2–10 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

(a) Complete the following table.

Symbol	Electron configuration
K	
Cr	
As	

(b) Explain the difference between the radii of the K atom and the K⁺ ion.

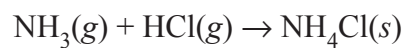
(c) The following table shows the electron configurations of four atoms, He, B, N, and Ne.

Arrange these atoms in order of increasing first ionisation energy by writing the symbol of the appropriate atom in the boxes below.

Atom	He	B	N	Ne
Electron configuration	$1s^2$	$1s^22s^22p^1$	$1s^22s^22p^3$	$1s^22s^22p^6$

	→		→		→	
lowest ionisation energy						highest ionisation energy

- (c) An equation for the reaction of ammonia gas with hydrogen chloride gas is:



Calculate the standard enthalpy change, $\Delta_r H^\circ$, for this reaction, using the following data.

$$\Delta_f H^\circ (\text{NH}_3(\text{g})) = -46 \text{ kJ mol}^{-1}$$

$$\Delta_f H^\circ (\text{HCl}(\text{g})) = -92 \text{ kJ mol}^{-1}$$

$$\Delta_f H^\circ (\text{NH}_4\text{Cl}(\text{s})) = -314 \text{ kJ mol}^{-1}$$

- (c) Ammonium nitrate dissociates in an endothermic reaction, as shown in the equation below.



Below is a table outlining four statements about changes in entropy that may occur during any reaction.

Tick (✓) to the left of any statement that is correct for the above reaction.

Tick (✓)	Entropy statement
	The entropy of the system increases.
	The entropy of the surroundings increases.
	The entropy of the system decreases.
	The entropy of the surroundings decreases.

Justify your choice(s).

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