



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Level 1, 2003

**Science: Describe properties and reactions
of groups of related substances (90189)**

National Statistics

Assessment Report

Assessment Schedule

Science: Describe properties and reactions of groups of related substances (90189)**National Statistics**

Number of Results	Percentage achieved			
	Not Achieved	Achieved	Merit	Excellence
36,441	37.1%	35.8%	23.4%	3.7%

Assessment Report**General Comments**

Every candidate for a National Certificate of Educational Achievement examination paper is expected to:

- read the question and do what the question asks
- allow adequate time to complete answers
- be accurate: check and/or proofread
- use appropriate technical terms
- bring the correct equipment
- write and/or draw clearly
- use pen if work is to be eligible for reconsideration.

The 2003 examination paper was straightforward and a minimal understanding of hydrocarbons, acids, bases and metals was required for achievement.

Candidates generally struggled with **describing** reactions. Where a description of observations for two common reactions was asked, it was clear that candidates answered from a theoretical background rather than familiarity with the reaction in the school laboratory. It was common for candidates to provide inconclusive evidence regarding observations, for example, 'change of colour', 'powder formed'. Evidence for achievement required specific observations for the reaction. Candidates also struggled with describing scientific properties of substances, in particular metals. Candidates tended to discuss the strength or price of metals rather than physical or chemical properties, and many chose to include metals other than the ones asked for.

There is sufficient time to write quality answers and proof read to avoid common errors. A number of candidates would assert in Question 2(d) that the litmus was red because magnesium hydroxide is an acid and then, in 2(e), claim that magnesium hydroxide was a base! Although most candidates knew the acidity increased in 2(a), they failed to recognise this caused a decrease in pH value, which is what the question asked for. Question 1(a) asked for reactive metals and Question 3(e)(i) asked for elements, both of which are straightforward for year 11. Many non metals were given for Question 1(a), and molecules for Question 3(e)(i) answers.

Correct terminology is encouraged at all times. Copper and magnesium do not rust; they corrode or oxidise. The Bunsen burner doesn't 'like' oxygen for 'breathing' or 'food'. The concept of 'no oxygen' and 'limited oxygen', are quite different. Acid does not 'eat' or 'kill' the base. There is an important difference between an alkali and a base; alkali was the correct term for Question 2(d) although base was accepted. Candidates struggled to distinguish between atoms and molecules in Question 3(e)(ii). It was also common to describe 'change of state' as a combustion reaction, or involving the breaking of bonds between atoms rather than between molecules.

Assessment Schedule

Science: Describe properties and reactions of groups of related substances (90189)

Evidence Statement

Question	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
	Describe characteristic properties and reactions of related substances.	Explain characteristic properties and reactions of related substances.	Apply an understanding of characteristic properties and reactions of related substances.
	Judgement <i>Description will include properties and reactions of metals and acids and alkalis and simple hydrocarbons and alcohols.</i>	<i>Explanations will include properties and uses and reactions of metals and acids and alkalis and simple hydrocarbons and alcohols.</i>	<i>Understanding is shown of properties, uses and reactions, and application is made of properties, uses and reactions of metals and acids and alkalis and simple hydrocarbons and alcohols.</i>
1(a)	Sodium/lithium/calcium/potassium/caesium/rubidium/francium (2 required) (symbols accepted)		
1(b)(i)	Bright (white) light / white powder / heat / magnesium disappears / grey to white colour change / smoke / magnesium oxide (2 required) not forms oxide, changes texture, changes colour, yellow light, sound, ash on its own		
1(b)(ii)	Magnesium and oxygen as reactants <i>If formulae used, must be correct "heat" may be included</i>	magnesium + oxygen = magnesium oxide <i>if formulae used, equation must be correct and balanced</i>	
1(c)	A property other than the one in the question is described: Mg : Cu Eg Cu: shiny (when polished) : Mg: malleable	Accurate explanation of 1 property for Mg : accurate explanation of 1 property for Cu Eg: metal is malleable : can be shaped / metal is ductile : can be made into a thin (wire) / magnesium would react : oxygen (air) / water / copper would react with salts	Accurate explanation of 1 property for Mg linked to relevance in producing a bracelet : accurate explanation of 1 property for Cu linked to relevance in producing a bracelet. Eg: Mg is malleable and can easily be shaped to form a bracelet. Cu reacts with salts and would leave green stains on the skin if worn as a bracelet.

Question	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
2(a)	Decrease/lower/reduce/goes down/ drops <i>NOT becomes more acidic</i>		
2(b)	Fizzing/bubbles/ effervescence/gas produced/ CO_2 produced/ solid dissolves/solid disappears <i>NOT frothing</i>		
2(c)	$\text{Mg}(\text{OH})_2$		
2(d)	Blue/purple: Magnesium hydroxide is a base (alkali) / bases turn litmus blue.	Blue/purple: Magnesium hydroxide is a base (alkali) : bases turn litmus blue.	
2(e)	One of: Magnesium hydroxide + hydrochloric acid = magnesium chloride + water / Base + acid = salt + water / products are neutral / have pH of 7 / cancel each other out (to give a neutral solution). <i>Word equation must be correct</i> <i>Symbol equation may have errors</i>	Equation (or similar statement re salt and water) : products of reaction are neutral/have a pH of 7 / cancel each other out (to give a neutral solution) / no OH^- or H_3O^+ ions left <i>Chemical equation need not be balanced</i> $\text{Mg}(\text{OH})_2 + 2\text{HCl} \longrightarrow \text{MgCl}_2 + 2\text{H}_2\text{O}$	Equation (or similar statement re salt and water) : products are neutral /cancel each other out (to give a neutral solution) : products have pH of 7 / no OH^- or H_3O^+ ions left <i>Chemical equation need not be balanced</i>

Question	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
3(a)(i) (ii) (iii)	Carbon. NOT soot on its own Carbon monoxide. Carbon dioxide.		
3(b)	Air hole (position) / colour of flame : oxygen supply / product / type of combustion Eg adjust air hole: less oxygen / C or CO produced/incomplete combustion <i>NOT air</i>	Air hole : (position) / colour of flame linked to two of oxygen supply / products / type of combustion Eg closed air hole: less oxygen : C or CO produced / incomplete combustion	Comparison made between air hole positions (open / closed) / oxygen supply / products / type of combustion ie open air hole / closed air hole / oxygen supply / products / type of combustion
3(c)	C_3H_8 , O_2 , CO_2 , H_2O at least 2 formulae both of which must be on the same side of equation Correct word equation	All formulae correct but balancing incorrect.	$C_3H_8 + 5O_2 = 3CO_2 + 4H_2O$
3(d)	$\begin{array}{c} H \\ \\ H-C-H \\ \\ H \end{array}$ <p>Or CH_4</p>		
3(e)(i)	Carbon/C : hydrogen/H <i>NOT H_2, lower case letters for symbols</i>		
3(e)(ii)	methane: small(er) molecule / fewer carbons / lower boiling pt / less attractive (intermolecular) forces hexane: large(r) molecule / more carbons / higher boiling pt / more attractive forces NOT breaking down molecule on its own	methane: small(er) molecule / fewer carbons : lower boiling point / less attractive (intermolecular) forces (between molecules) hexane: large(r) molecule / more carbons : higher boiling point / greater attractive forces (between molecules)	methane: small(er) molecule / fewer carbons : lower boiling point : less attractive (intermolecular) forces (between molecules) hexane: large(r) molecule / more carbons : higher boiling point : greater attractive forces (between molecules)

Judgement Statement

Judgement statements (formerly referred to as sufficiency statements) help students understand how their overall results for each standard were arrived at.

Achieved	Achievement or better in 7 opportunities
Achieved with Merit	Achieved plus Merit or Excellence in 4 questions
Achieved with Excellence	Merit plus Excellence in 3 questions including 3c