National Certificate of Educational Achievement

2013 Assessment Report

Chemistry Level 1

90932 Demonstrate understanding of aspects of carbon chemistry

90933 Demonstrate understanding of aspects of selected elements

90934 Demonstrate understanding of aspects of chemical reactions

COMMENTARY

Candidates who attempted all questions were normally able to achieve.

The presence of accurate observations highlighted that many candidates were being exposed to the relevant practical work during their school year.

It is important that candidates spend some time reading the question carefully to ensure the intent of the question is clearly understood.

In general, candidates would benefit from planning their answers before they start to write, to make sure their answer is cohesive, relevant and using correct scientific language. The space provided for answers is generally a good guide as to how much a candidate should write.

STANDARD REPORTS

90932 Demonstrate understanding of aspects of carbon chemistry

ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They typically:

- drew correct structural formulae
- identified products of combustion
- stated observations of combustion reactions
- stated the conditions required for the process of fermentation to occur
- identified correct facts for the process of fractional distillation
- stated uses and properties of polypropene
- identified physical properties of carbon compounds.

NOT ACHIEVED

Candidates who were assessed as Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They typically:

- tried to relate the structure of polypropene to its property rather than linking the use to the property
- used colloquial language in their answers such as; alkanes are ‘full up’, hydrocarbons need to be ‘split apart’, polypropene is ‘tough’
- confused CO_2 as a gas that destroys the ozone layer rather than being a greenhouse gas
- omitted oxygen in a combustion reaction equation.

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit typically:

- explained effects of products of combustion reactions
- linked concepts of size, boiling point and/or collection point of different hydrocarbons when writing about fractional distillation

- wrote correct formulae in a chemical equation
- understood that fractional distillation is a separation process
- linked properties of a polymer accurately to a feasible use
- linked the breaking of a double bond to the formation of a polymer
- linked physical properties of carbon compounds to their structure or bonding
- linked the conditions of fermentation to the process of producing ethanol.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence typically:

- wrote balanced chemical equations
- evaluated comprehensively, the effects of combustion on the environment or human health
- analysed the process of fractional distillation with clear links to the energy, attractive forces and size of hydrocarbons, including the recognition that the C1-C4 compounds are collected as gases
- outlined the process of polymerisation comprehensively, and accurately used scientific terms
- comprehensively related physical and chemical properties of a polymer to its relevant use
- linked the role of bonding to physical properties of carbon compounds
- analysed the process of fermentation to show clear understanding.

OTHER COMMENTS

Chemical terminology is important. Properties of a polymer should be described as strong, flexible, unreactive rather than tough and durable. Fractional distillation involves separating hydrocarbons not ‘breaking them up’.

90933 Demonstrate an understanding of aspects of selected elements

ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They typically:

- knew the symbols for the relevant elements and their ions
- described how an element becomes an ion
- wrote correct electron configurations for different elements and ions
- described observations of reactions
- provided uses and relevant properties of ozone
- wrote word equations for reactions
- described relevant properties of metals related to their described roles.

NOT ACHIEVED

Candidates who were assessed as Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They typically:

- used incorrect chemical terms
- did not identify relevant properties of chemicals
- did not show understanding of chemical or physical properties and their relevance to a particular situation.

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit typically:

- linked properties of ozone to its use as a disinfectant
- linked observations of reactions to the chemical species involved
- explained chemical concepts concisely and relevantly
- linked loss or gain of electrons to the position on the periodic table or to the charge of an ion
- linked some observations to particular species in a reaction
- wrote unbalanced chemical equations
- linked relevant physical and chemical properties of metals in an alloy and related them to a use
- linked reactivity of metals to their position in the activity series.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence typically:

- linked loss or gain of electrons to the position on the periodic table and to the charge of an ion
- linked relevant physical and chemical properties of all metals in an alloy and related them to a use
- wrote balanced chemical equations
- linked dissociation to ions, to an ability to carry charge and the changes in concentration of species present during an easily reversible reaction
- discussed comprehensively ozone’s ability to act as a disinfectant
- explained properties comprehensively and linked them to relevant uses of the chemicals
- provided observations and linked them to the chemical species involved and to the activity series.

OTHER COMMENTS

Although candidates are encouraged to attempt all questions, even if they may be unsure of the expected response, it is better that they write a concise answer rather than lengthy responses in the hope that something relevant is included.

90934 Demonstrate an understanding of aspects of chemical reactions

ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They typically:

- recorded correct observations, e.g. lead iodide is a yellow precipitate
- wrote the formulae for simple ionic compounds
- identified the type of reaction
- described a suitable test for carbon dioxide and/or water.

NOT ACHIEVED

Candidates who were assessed as Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They typically:

- showed charges on salt formulae where a full equation was written
- identified incorrect products, e.g. hydrogen as a product of the thermal decomposition of calcium hydroxide
- included oxygen as a reactant in the thermal decomposition reaction(s).

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit typically:

- linked observations to the correct species involved
- explained appropriate tests for identifying carbon dioxide and/or water
- wrote unbalanced symbol equations
- explained the electron transfer involved in the formation of an ionic compound or the sharing of electrons (lack of electron transfer) during the formation of a covalent compound.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence typically:

- wrote balanced symbol equations
- justified the type of reaction occurring
- compared and contrasted the thermal decomposition of two different compounds
- explained the electron transfer involved in the formation of an ionic compound and the sharing of electrons (lack of electron transfer) during the formation of a covalent compound.

OTHER COMMENTS

Candidates generally identified and accurately justified reaction types. However, although a combination reaction was frequently identified for question three (b), it was seldom justified as the joining of different elements to make a compound. Instead, some candidates explained that products/substances/compounds were joined together.

Only the very able candidates were able to *compare and contrast* the two thermal decomposition reactions for question two. Less able candidates often showed a lack of understanding of this type of reaction since they included oxygen as a reactant and referred to the solids as ‘burning’.

Many candidates are clearly completing relevant practical work in preparation for this standard as observations were generally accurate. Many candidates easily completed the results table for displacement reactions. Some candidates, however, identified calcium oxide as a black solid, clearly mistaking it for copper(II) oxide (a product of thermal decomposition reactions in examination papers from the past two years). The water produced from the thermal decomposition of calcium hydroxide was generally described as steam or a colourless liquid rather than as a colourless gas.