National Certificate of Educational Achievement

2014 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 more likely to gain at least an Achievement level performance.

Candidates who read the questions thoroughly and ensured that their answers addressed the question were successful. This included addressing all bullet points within a longer answer.

Some candidates did not appear to understand the difference between an observation and an inference; an example of this was giving word equations when the question asked for observations.

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 commonly:

- named and drew structural formulae for carbon compounds
- identified the type of bonding in both alkanes and alkenes
- gave general formulae for alkanes or alkenes
- outlined how alkenes break their double bond to form polymers
- recognised that addition polymers are unreactive / non-biodegradable
- described the trend in boiling point versus the number of carbon atoms in alkanes
- described an effect of complete or incomplete combustion on the environment and / or human health.

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 commonly:

- identified the bonding in alkanes and alkenes as ‘molecular’
- explained that alkenes are used to make polymers because the double bond makes them strong
- related the lack of reactivity of addition polymers to the attractions between the polymers or to physical properties such as solubility
- used vague terms to define boiling point, such as ‘the point at which an object turns into another substance’
- related boiling point of carbon compounds to the number of covalent bonds present
- omitted oxygen from combustion equations
- confused carbon dioxide as a gas that destroys the ozone layer and carbon monoxide as a gas that causes lung cancer.

ACHIEVEMENT WITH MERIT

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

- explained that covalent bonding occurs to achieve a full valence shell
- explained similarities and differences in the bonding found in alkanes and alkenes
- wrote correct symbol equations which were unbalanced
- explained why long chain alkanes are unsuitable as fuels
- explained the trend in boiling point versus the number of carbon atoms in alkanes, by relating either the mass of alkanes or the strength of the intermolecular attractions to the heat energy required
- linked solubility to the relative attractions between carbon compounds and water
- explained complete and incomplete combustion reactions, and elaborated on their effects on either the environment and/or human health.

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 commonly:

- linked the chemical bonding in alkanes and alkenes to either a relevant property and/or common use for each
- explained fully why long chain alkanes need to undergo cracking, including the uses of the products of cracking
- explained comprehensively why alkenes are suitable for making polymers but alkanes are not
- linked the single covalent bonding in addition polymers to their lack of reactivity and therefore their presence in floating islands of plastic
- compared and contrasted the chemical bonding between different carbon compounds to explain differences in physical properties such as solubility and boiling point
- wrote correctly balanced symbol equations
- comprehensively explained the complete combustion of methanol and the incomplete combustion of methane, and their effects on the environment and/or human health.

OTHER COMMENTS

Some candidates did not identify a relevant property of alkanes that makes them suitable for use as fuels or a relevant property of alkenes that makes them suitable for turning into polymers. Very few candidates recognised that the double covalent bond found in alkenes causes them to be reactive. Some candidates did not seem to know what the term ‘property’ means.

A significant number of candidates gave a balanced symbol equation for methane undergoing complete combustion in question 4(c), but then contradicted themselves by explained that methane undergoes incomplete combustion in the scenario given.

A significant number of candidates gave the formula for methanol in the equation for question 4(b) (ii) as CH_4O rather than CH_3OH. Candidates were not penalised since it is a correct molecular formula, but CH_3OH is preferable as it indicates the functional group.

90933 Demonstrate understanding of aspects of selected elements

ACHIEVEMENT

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

- wrote / drew electron configurations for elements and their ions
- described how an element becomes an ion
- described observations of reactions
- provided uses or relevant properties of allotropes of carbon
- wrote word equations or partial symbol equations for reactions
- described physical or chemical properties of ammonia
- described physical or chemical properties of aluminium.

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 commonly:

- did not describe how or why different atoms become ions
- used incorrect chemical terms and or colloquialisms
- did not show understanding of chemical or physical properties and their relevance to a particular situation or use of a metal.

ACHIEVEMENT WITH MERIT

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

- linked properties of carbon / oxygen allotropes to their use
- 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 symbol equations
- linked relevant physical and chemical properties of aluminium to its use
- explained the benefits of using alloys as opposed to a pure metal
- 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 commonly:

- linked group number to the loss or gain of electrons to achieve stability and the resulting charge of the ion
- linked relevant physical and chemical properties of metals in an alloy to its end use
- wrote balanced symbol equations
- linked dissociation into ions to the ability to carry charge and the changes in concentration of species present during an easily reversible reaction
- showed comprehensive understanding of the properties of ammonia

- linked the bonding of atoms in an allotrope of an element to the properties of that allotrope
- provided observations and linked them to the chemical species involved and to their position on the activity series in relation to hydrogen.

90934 Demonstrate understanding of aspects of chemical reactions

ACHIEVEMENT

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

- recorded observations correctly, e.g. the blue solution turns colourless
- identified the type of reaction correctly
- wrote the formulae for ionic 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 commonly:

- wrote the names of reactants and products instead of giving observations as asked
- identified incorrect products for different reactions
- showed charges on formulae in a symbol equation
- showed charges on a metal in a displacement reaction.

ACHIEVEMENT WITH MERIT

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

- linked observations to the chemical species involved
- linked the activity series to the probability of a reaction
- compared or contrasted a reaction
- wrote unbalanced symbol equations
- explained electron transfer in the formation of an ionic 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 commonly:

- wrote balanced symbol or ionic equations
- justified the type of reaction occurring
- compared and contrasted thermal and catalytic decomposition
- explained spectator ions in addition to explaining the formation of a precipitate
- recognised that hydrogen peroxide decomposes naturally, and that the process can be sped up with a catalyst.

OTHER COMMENTS

Candidates were generally able to identify and justify reaction types.

Many candidates could link observations to the reaction. It is important that candidates read the question and ensure they are concise and relevant in their answer to illustrate comprehensive understanding.

When asked to compare and contrast, candidates need to cover both aspects in their answer rather than complete just one aspect. A comparison may be as simple as defining what the reaction is and what that means in the context asked. Candidates need to consider how a colourless gas may be observed, such as water vapour condensing in the tube.