

# **National Certificate of Educational Achievement**

## **2012 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.

Level 1 Chemistry is based on a significant amount of practical work, candidates who were exposed to hands on experiences which involved recording observations and then linking these to the actual situation, as well as the theory were more likely to be successful.

To gain the higher grades of Achievement with Merit and Excellence, candidates who were successful could link them to the relevant species and explain how or why these observations occurred.

Candidates who were able to unpack the language in the standards recognised what was required for the higher grade of Achievement with Excellence. These candidates knew what to do when instructions in questions included analyse, compare and contrast, or evaluate.

In general, candidates would benefit from planning their answers before they start to write. 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:**

- defined concepts such as fermentation, complete combustion and cracking
- described valid effects of combustion reactions
- drew and named organic chemicals correctly
- identified information using reference sources.

#### 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:**

- confused the greenhouse effect with the ozone layer
- drew ethane instead of ethene for the monomer
- provided the wrong conditions and incorrect products for fermentation
- confused fractional distillation with cracking
- confused boiling point with the breaking of covalent bonds within a molecule
- used terms such as 'tough' or 'strong' to describe a property of a polymer.

#### ACHIEVEMENT WITH MERIT

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

- wrote the correct formulae of each chemical species in an equation
- linked the trend of the boiling point to the size of the molecule

- explained the environmental effect of too much CO<sub>2</sub> in the atmosphere
- explained the type of products formed when hexane underwent cracking
- explained why long chained hydrocarbons are inefficient fuels
- related the little/no attraction between oil and water molecules to the insolubility of oil in water
- linked the polymer chain packing to the property of flexibility for the polymer polyethene (polyethylene)
- linked the non-biodegradability of plastics to its lack of reactivity.

### **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:**

- balanced chemical equations correctly
- evaluated the effect of CO<sub>2</sub> in the atmosphere
- applied properties of longer chained fuels such as volatility and ease of ignition to their inefficiency as a fuel
- linked the properties of oil with water to the observations described
- justified the properties of the plastics in relation to their uses
- linked the reason for the non-reactivity of a plastic to its inability to biodegrade in the environment.

### **OTHER COMMENTS**

Candidates who used incorrect terminology struggled to achieve, e.g. using colloquial terminology, such as 'tough' or 'strong' to represent specific properties.

## **90933 Demonstrate understanding of aspects of selected elements**

### **ACHIEVEMENT**

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

- recognised metals and non-metals
- recognised that metals lost electrons OR that metals became positive ions
- recognised that non-metals gained electrons OR that non-metals became negative ions
- wrote electron configurations correctly
- described chlorine water as acidic and ammonia as a base
- wrote word equations correctly
- identified that litmus changed to red in acids and blue in bases.

### **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:**

- confused chlorine with other halogens

- could not distinguish between ammonium and ammonia
- confused chemical and physical properties
- confused bonding in ionic and metallic substances with covalent bonding
- allocated charges to neutral compounds and elements.

### **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 that metals lost electrons to form positive ions
- explained that non-metals gained electrons to form negative ions
- linked some observations to particular species in a reaction
- linked the loss and gain of electrons to the formation of positive and negative ions
- wrote an unbalanced equation
- linked physical or chemical properties of substances to an observation.

### **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
- linked observations to the species involved in a reaction
- related acidity and basicity to the ratio of  $\text{H}_3\text{O}^+$  and  $\text{OH}^-$  in a solution
- explained why the ratio of ions in a formula occurred
- related their knowledge that chlorine water was an acid and a bleach to the observation that litmus paper would go red and then white
- linked specific properties of chlorine to how it kills microorganisms
- explained why the water level rose due to the high solubility of ammonia and linked it to a decrease in pressure on the inside of the test tube
- related properties of metals and alloys to the arrangement of atoms in each
- analysed the advantages and disadvantages of using Stirling silver compared to pure silver for jewellery by linking chemical and physical properties of each to that use.

### **OTHER COMMENTS**

Some candidates incorrectly used an equals sign (=) rather than an arrow ( $\rightarrow$ ) in balanced chemical equations.

## **90934 Demonstrate understanding of aspects of chemical reactions**

### **ACHIEVEMENT**

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

- provided appropriate observations for some reactants and products
- described a suitable test to identify carbon dioxide
- identified some reaction types, commonly displacement and precipitation
- wrote the correct formulae for reactants and products

- identified the relative reactivity of different metals based upon the activity series and information provided on displacement reactions
- identified an appropriate solution to form a precipitate with chloride ions based upon the solubility rules.

## **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:**

- identified incorrect products, e.g. hydrogen peroxide as the product of the reaction between hydrogen and oxygen
- showed charges on salt formulae where a full equation was written
- showed iron(II) ions as a reactant in the displacement equation rather than iron metal
- added lead or silver metal to identify chloride ions, or a compound like lead sulfate which would not form a solution.

## **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 some observations to the correct chemical species
- provided reasons for the reaction types identified
- explained the role of a catalyst
- interpreted displacement reactions to explain the relative reactivity of different metals
- wrote equations that were unbalanced.

## **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 detailed observations to the relevant chemical species for each reactant and product
- explained a displacement reaction in terms of atoms, ions, and electron transfer
- added an appropriate solution that would only form a precipitate with chloride ions
- recognised the spectator ions present in a reaction
- wrote balanced equations.

## **OTHER COMMENTS**

Chemical terminology was poorly used by candidates gaining Not Achieved or Achievement. Terms such as element and compound were confused, and some candidates did not distinguish between atoms and ions in their use of words and symbols, e.g. Fe(II) was used instead of Fe to describe the metal iron in written explanations.

Generally observations were poorly done, e.g. water was described as a *clear* liquid instead of a *colourless* liquid and many candidates did not record observations prior to any reaction occurring.