

# **Scholarship**

## **2009 Assessment Report**

### **Chemistry**

## COMMENTARY

The 2009 paper had six questions in contrast to the 2008 paper which had five. Questions covered a range of content from Level 2 and Level 3 Chemistry and required an understanding of both problem-solving and qualitative analysis.

Most candidates did not appear to find the paper long, although there were some scripts submitted which did not attempt all questions. The long and repetitive answers from some candidates suggested that they considered that they had time available to do this.

The ability to have written clearly and concisely and to “have communicated using appropriate terms, formulae, equations and well reasoned explanations” was expected of a candidate achieving at Scholarship level. Some candidates showed poor planning, producing repetitive responses that did not meet the standard. Although a question may not specifically ask to include equations, candidates should have known when it was appropriate to do so.

## SCHOLARSHIP WITH OUTSTANDING PERFORMANCE

### **Candidates who were awarded Scholarship with Outstanding Performance typically:**

- wrote logical and coherent responses without unnecessary repetition of statements
- wrote answers that were appropriately supported by correctly balanced equations and/or formulae
- answered calculations correctly showing their working clearly set out
- applied their knowledge of chemistry to unfamiliar situations
- demonstrated a depth of knowledge of the concepts in Level 2 and Level 3 Chemistry
- used the information provided to answer the questions
- demonstrated a superior ability to analyse information to solve problems
- predicted the correct molecular polarities using molecular shape and electronegativities of the atoms
- showed complex ions correctly
- demonstrated a thorough knowledge of organic functional group chemistry
- understood calculations using  $K_a$  and  $pK_a$
- correctly described changes of concentration of species in solution when strong acids, weak acids and buffers are diluted, and the effect of each on the pH.

## SCHOLARSHIP

### **Candidates who were awarded Scholarship but not Scholarship with Outstanding Performance commonly:**

- predicted and drew 3-dimensional structures using the correct conventions, and correctly predicted bond angles
- used electronegativities to predict which atoms would form ions
- linked Lewis structures correctly to bond angles by discussing the effect of the non-bonding electron pairs
- calculated  $E^0$  values correctly
- recognised that the electrostatic attraction between ions is stronger than the hydrogen bonding between molecules

- demonstrated a knowledge of dipeptide formation and drew the appropriate structures
- discussed the basic nature of the amine group and acidic nature of the carboxylic acid group
- demonstrated a sound knowledge of the processes of reflux and distillation and linked these to the hydrolysis of esters
- recognised that a high equilibrium constant indicates a high concentration of products in an equilibrium reaction
- used the equilibrium constant expression and known concentrations to calculate unknown concentrations
- wrote correctly balanced equations.

## **OTHER CANDIDATES**

### **Candidates who were not awarded Scholarship or Scholarship with Outstanding Performance commonly:**

- did not attempt all questions
- did not write their responses in a clear and concise fashion
- showed misconceptions in their understanding of chemical concepts and principles
- did not use the information provided
- did not demonstrate a level of knowledge that would be expected of a high-achieving Level 3 candidate
- did not use correct conventions to draw molecules in three dimensions
- did not use the electronegativities of elements to predict which ions would form
- drew Lewis structures with the wrong number of electrons
- did not use the relevant conventions to draw Lewis structures
- did not write balanced equations for reactions under discussion
- did not draw dipeptide structures correctly
- considered an amide group to be basic and an alcohol group to be acidic
- did not differentiate between chemical and physical properties when discussing trends in melting and boiling points (e.g. described low melting/boiling points being due to an element being unreactive)
- carried out the calculations using enthalpy values incorrectly
- did not substitute known concentrations into the equilibrium expressions when attempting to solve for unknowns
- did not know the formula of nitric acid, and did not know that it was a strong acid
- did not write the equilibrium constant expression for the dissociation of a weak acid correctly
- converted  $K_a$  values to  $pK_a$  incorrectly.