

**GCE**  
**AS and A Level**

# **Chemistry**

**AS exams 2009 onwards**  
**A2 exams 2010 onwards**

## **Unit 6T: ISA** **Specimen mark scheme**

**Version 1.3**





## **General Certificate of Education**

# **Chemistry**

**CHM6T Investigative Skills Assessment  
(ISA) Centre Assessed Unit**

# **Marking Guidelines**

*Specimen Paper*

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. The specimen assessment materials are provided to give centres a reasonable idea of the general shape and character of the planned question papers and mark schemes in advance of the first operational exams.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: [www.aqa.org.uk](http://www.aqa.org.uk)

Copyright © 2007 AQA and its licensors. All rights reserved.

#### COPYRIGHT

AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

---

**ASSESSMENT OF IMPLEMENTAION**

The following skills are assessed from the **Candidate Results Sheet:**

Recording and accuracy

(a) the **recording** of results

constructs sensible table; 1

results recorded clearly in the table; 1

(b) the **accuracy** of the observations (mark to the grid on page 4)

12 scoring points 6 max

11-12 points scores 6 marks

9 -10 points scores 5 marks

7 - 8 points scores 4 marks

5 - 6 points scores 3 marks

3 - 4 points scores 2 marks

1 - 2 points scores 1 marks

**Total 8**

**Expected Observations**                      **glucose**                      **ethanoic acid**                      **methanoic acid**

Test	Observation with Compound A	Observation with Compound B	Observation with Compound C
Test 1 Fehling's solution	red/orange precipitate	no visible change	no visible change
Test 2 acidified potassium manganate(VII) solution	brown precipitate or colourless solution	no visible change	colourless solution
Test 3 sodium hydrogen-carbonate	no visible change	effervescence	effervescence
Test 4 methyl orange	no visible change	red solution	red solution

---

**SECTION A****ANALYSING****Question 1**

**A** 1  
red/orange precipitate with Fehling's solution 1

**Question 2**

**B and C** 1  
effervescence with sodium hydrogencarbonate/ indicator changes colour 1

**Question 3**

**C** 1  
decolourises  $\text{KMnO}_4$  1

**Question 4**

(NaOH and heat) test gas with indicator/conc HCl 1  
colour change for an alkali/white fumes 1

**Total 8**

**SECTION B****ANALYSING****Question 5**

$$K_c = \frac{[\text{CH}_3\text{COOCH}_2\text{CH}_3][\text{H}_2\text{O}]}{[\text{CH}_3\text{COOH}][\text{CH}_3\text{CH}_2\text{OH}]} \quad 1$$

**Question 6**

$$\text{moles} = 0.42/60 = 0.007 \quad 1$$

**Question 7**

$$\begin{aligned} \text{moles} &= MV/1000 = 0.5 \times 3/1000 = 1.5 \times 10^{-3} & 1 \\ \text{moles acid} &= 1.5 \times 10^{-3} & 1 \end{aligned}$$

**Question 8**

$$\begin{aligned} \text{moles acid used} &= 7 \times 10^{-3} - 1.5 \times 10^{-3} = 5.5 \times 10^{-3} & 1 \\ \text{equil moles ester} &= \text{water} = 5.5 \times 10^{-3} & 1 \end{aligned}$$

**Question 9**

$$\text{equil. moles alcohol} = 0.01 - 5.5 \times 10^{-3} = 4.5 \times 10^{-3} \quad 1$$

$$K_c = \frac{(5.5 \times 10^{-3})^2}{(1.5 \times 10^{-3})(4.5 \times 10^{-3})} = 4.48 \quad 1$$

$$K_c \text{ to 3 sig figs} \quad 1$$

**Question 10**

$$\text{total error } 5.2\% \text{ (} 0.2\% + 5.0\%, \text{ based on } 0.42 \text{ g and } 3.0 \text{ cm}^3\text{)} \quad 1$$

**Question 11**

not reversible/ better yield /room temperature/ reaction faster 1

ethanoyl chloride very corrosive / reaction violent / HCl fumes 1

**Total 12**

---

**EVALUATION****Question 12**

difference of 0.56 against 3.92 is a 14.3% error 1

**Question 13**

discrepancy > apparatus error so some procedure error/ operator error 1

**Question 14**

(titre of 15 - 30 cm<sup>3</sup> requires) 0.1 M to 0.05 M 1  
reduces burette error/ more accurate endpoint 1

**Question 15**

$K_c$  temperature dependant 1

**Question 16**

percentage yield is 87.0 1

**Question 17**

adding reagent drives reaction forward 1  
greater percentage of ester in product 1

**Question 18**

conduct reaction at 40-60 °C 1  
volatile ester distils out of mixture 1

**Total 10**