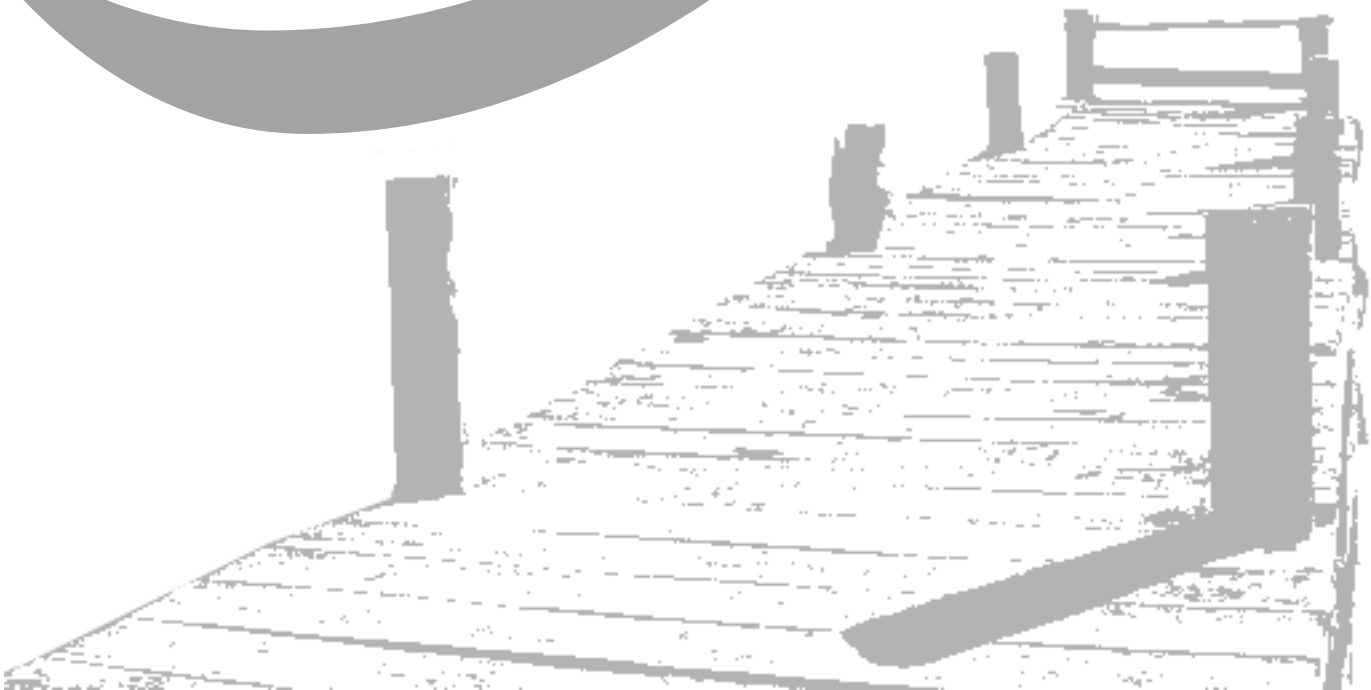
GCE
AS and A Level

Chemistry

AS exams 2009 onwards
A2 exams 2010 onwards

Unit 6T: ISA
Specimen mark scheme

Version 1.3



Version 1.2: 01/08

ASSESSMENT and QUALIFICATIONS ALLIANCE

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.

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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 $KMnO_4$	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

$K_c = \dfrac{[CH_3COOCH_2CH_3][H_2O]}{[CH_3COOH][CH_3CH_2OH]}$ 1

Question 6

moles = 0.42/60 = 0.007 1

Question 7

moles = MV/1000 = 0.5 x 3/1000 = 1.5×10^{-3} 1
moles acid = 1.5×10^{-3} 1

Question 8

moles acid used = $7 \times 10^{-3} - 1.5 \times 10^{-3} = 5.5 \times 10^{-3}$ 1
equil moles ester = water = 5.5×10^{-3} 1

Question 9

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

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

K_c to 3 sig figs 1

Question 10

total error 5.2% (0.2% + 5.0%, based on 0.42 g and 3.0 cm^3) 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^3 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 ^oC	1
volatile ester distils out of mixture	1

Total 10