GCE
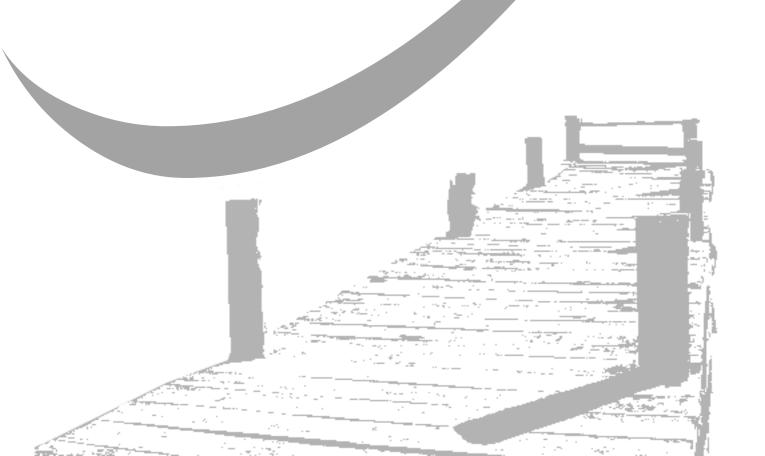**AS and A Level**

Chemistry

AS exams 2009 onwards
A2 exams 2010 onwards

Unit 6X: EMPA
Specimen mark scheme
Version 1.0

AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

General Certificate of Education

Chemistry 2421

CHM6X   **Externally Marked Practical Assignment (EMPA) Board Assessed Unit**

Marking Guidelines

Specimen Paper

Set and published by the Assessment and Qualifications Alliance.

Stage 1

1   Points assessed from **Candidate Results Sheet Task 1**.

(a) the **recording** of results   constructs sensible tables for all data   **1**

                                           results recorded clearly in the tables   **1**

                                           all results recorded with appropriate precision   **1**

(b) the **accuracy** of the results

     Task 1 Part 1   boiling point   within 3° of target value   **2**
                                            within 5° of target value   **1**

     Task 2 Part 1   yield   within 3° of target value   **2**
                                            within 5° of target value   **1**

     Task 2 Part 2   melting point   within 1° of target value   **1**
     pure sample

     candidate's sample   within 1° of target value   **2**
                                            within 2° of target value   **1**

     Task 2 Part 3   titre value/g   within 1% of target value   **2**
                                            within 2% of target value   **1**

                                                                              Total   12 marks

SECTION A

Question 1

23.15   **1**
volume quoted to 2 dp   **1**

Question 2

moles alkali = moles acid = 1.15(8) x 10^{-3} **1**
concentration = 0.0463   **1**

Question 3

concentration = 1.419 x 4 = 5.676g dm^{-3} **1**

Question 4

M_r = 5.676/0.0463 = 122.6   **1**

Question 5

evidence of using data   **1**
ethyl benzoate   **1**

                                                                    Total   8 marks

SECTION B

Question 6

(a) 2500-3000 cm^{-1} **1**
(b) 1680-1750 cm^{-1} **1**

Question 7

compare fingerprint regions **1**
exact match **1**

Question 8

peak at 1.2 due to a proton *c* **1**
signal split into triplet by adjacent CH_2 group **1**
peak at 2.0 due to proton *a* **1**
signal not split as no adjacent protons **1**
peak at 4.1 due to a proton *b* **1**
signal split into quartet by adjacent CH_3 group **1**

Question 9

$[CH_3CO]^+$ **1**
$[CH_3COOCH_2]^+$ **1**

Question 10

(a) sample impure/ damp **1**
(b) heating too quickly at the melting point **1**

Question 11

several results reduce allow identification of anomalies/ establish pattern/ more reliable **1**

Question 12

M_r of $CH_3COOCH_2CH_3$ is 88 **1**
66.7% **1**

Question 13

not reversible/ better yield /room temperature/ reaction faster **1**
ethanoyl chloride very corrosive / reaction violent / HCl fumes **1**

Question 14

88 x 100/ 148 = 59.5%   6   **1**

Question 15

prevent cracking/ breaking when bent   **1**
lost by evaporation   **1**

                                                              Total   22 marks

SECTION C

Question 16

(a) reaction catalysed by one of the products   **1**

(b) measures time taken for mixture to decolourise after adding given amount from burette **1**
    measures time taken for mixture to decolourise after adding same given amount   **1**
    second time shorter   **1**

Question 17

(a) boil mixture without loss of liquid/ using a condenser   **1**
    complete reaction   **1**

(b) boiling points of water and acid too close together   **1**
    fractionating column   **1**

Total   8 marks