Candidate Name	Centre Number	Candidate Number

WELSH JOINT EDUCATION COMMITTEE
General Certificate of Education
Advanced Subsidiary/Advanced

WJEC CBAC

CYD-BWYLLGOR ADDYSG CYMRU
Tystysgrif Addysg Gyffredinol
Uwch Gyfrannol/Uwch

333/01

CHEMISTRY CH3a

P.M. TUESDAY, 15 May 2007

(45 minutes)

FOR EXAMINER'S USE ONLY	
Question	Mark
1	
2	
3	
TOTAL MARK	

ADDITIONAL MATERIALS

In addition to this examination paper, you will need a:
- calculator;
- copy of the **Periodic Table** supplied by WJEC. Refer to it for any **relative atomic masses** you require.

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions in the spaces provided.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

The maximum mark for this paper is 30.

Your answers must be relevant and must make full use of the information given to be awarded full marks for a question.

You are reminded that marking will take into account the Quality of Written Communication used in all written answers.

Page 7 may be used for rough work.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

Candidates are advised that answers to all questions should be brief and concise; lengthy extended responses are not required.

1. A student studied the rate of hydrolysis of an ester, methyl methanoate, $HCOOCH_3$, by KOH in aqueous solution.

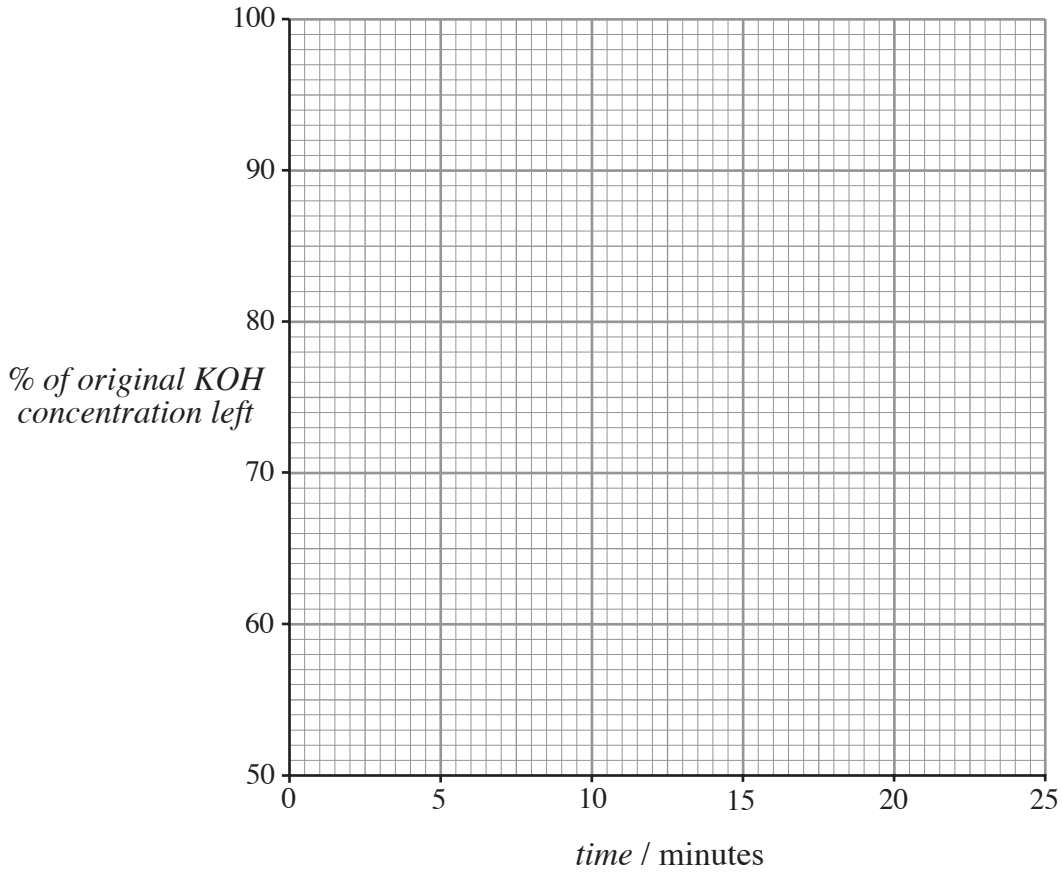
$$HCOOCH_3 + KOH \longrightarrow HCOOK + CH_3OH$$

The ester was mixed with an equal concentration of KOH solution and a stop-clock started. A small sample of the reacting mixture was withdrawn at 5-minute intervals and the reaction in the sample stopped. The KOH remaining in the sample was titrated against a standard solution of acid to neutralize it.

The following results were obtained.

Time / minutes	0	5	10	15	20	25
% of original KOH concentration left	100	92	84	77	71	66

(a) (i) Plot these results on the grid below and draw the curve. [3]



(ii) Use your plot to calculate the initial rate of reaction (units not required). [2]

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.....

(b) The experiment was repeated twice more, using different initial concentrations of ester and KOH. The results are shown in the table below. Insert your answer for *(a)*(ii) into the first row of the *Initial rate* column.

Relative initial concentration of		*Initial rate*
ester	*KOH*	
100	100	
200	100	3·2
200	200	6·4

Use the results in the table to describe the effect on the rate of changing the concentration of

(i) ester,

.....

(ii) KOH.

.....

[2]

(c) Answer the following questions about the experimental method used.

(i) Explain why the experiment was carried out at a constant temperature. [1]

.....

.....

(ii) Suggest a way in which the reaction in the samples taken could be rapidly stopped. [1]

.....

.....

(iii) Explain why the step in (ii) is necessary. [1]

.....

.....

(iv) In the first experiment, the initial concentrations of the ester and KOH were equal. Explain how the student could calculate the ester concentration in the samples from the titration results. [2]

.....

.....

Total [12]

2. The following method was used in an experiment to find the concentration of chloride ions in an aqueous solution. No other halide ions were present.

1. 25·0 cm^3 of the solution was acidified with nitric acid.
2. A slight excess of silver nitrate solution was added to the solution and the resulting precipitate filtered.
3. The filtrate was tested with a few drops of silver nitrate solution.
4. The precipitate from 2 was washed with water.
5. The precipitate was heated in an oven to constant mass.

The mass of precipitate obtained was 0·500 g.

(a) Write an ionic equation for the reaction, giving state symbols. [1]

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(b) Give the reason for

(i) using a slight excess of silver nitrate, [1]

.....

.....

(ii) acidifying the solution, [1]

.....

.....

(iii) testing the filtrate with a little silver nitrate, [1]

.....

.....

(iv) washing the precipitate with water, [1]

.....

(v) heating the precipitate to constant mass. [1]

.....

(c) Use the A_r values Ag = 108 and Cl = 35·5 to calculate the concentration of chloride ions in the original solution in

(i) mol dm^{-3},

.....

.....

(ii) g dm^{-3}.

.....

.....

[4]

Total [10]

3. A sequence of organic reactions is shown below.

$$\underset{\textbf{A}}{CH_3CH_2Br} \longrightarrow \underset{\textbf{B}}{HBr + CH_2 = CH_2} \xrightarrow{H_2O} \underset{\textbf{C}}{CH_3CH_2OH} \longrightarrow \underset{\textbf{D}}{CH_3COOH}$$

Each of these organic compounds may be identified by **one** of the tests in the table below. Complete the table by inserting the letter for the correct compound and stating what is observed. [8]

Test	*Compound*	*Observation*
Heat with NaOH(aq), acidify with HNO_3 and then add $AgNO_3$(aq)		
Add $NaHCO_3$(aq) and test the product		
Add bromine water		
Warm with acidified dichromate(VI) solution		

Total [8]

Examiner only
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Rough Work