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

A.M. THURSDAY, 18 May 2006

(45 minutes)

FOR EXAMINER'S USE ONLY	
Question	Mark
1	
2	
3	
4	
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 9 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.

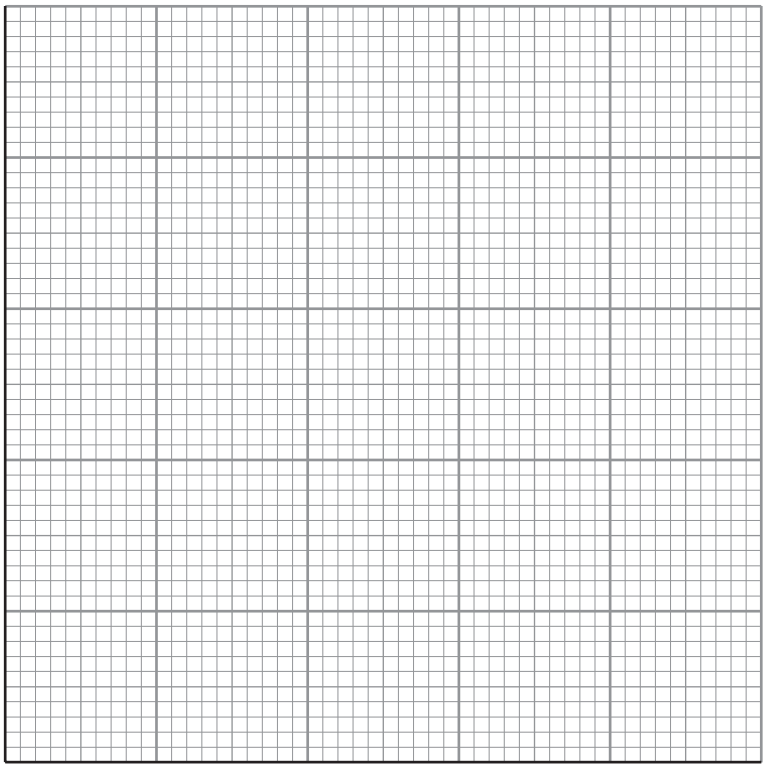
1. A student obtained the following results when measuring the initial rate of decomposition of aqueous hydrogen peroxide, as in the following equation.

$$H_2O_2(aq) \longrightarrow H_2O(1) + \tfrac{1}{2}O_2(g)$$

concentration of peroxide / mol dm^{-3}	0·100	0·200	0·300	0·400	0·500
rate / mol $dm^{-3}s^{-1}$	0·050	0·100	0·148	0·220	0·250

(a) (i) Choosing suitable scales for the axes that make full use of the grid, label each axis and plot the results on the grid below. [4]

(ii) Draw the line which best fits the points. [1]



(b) (i) From your plot, state the effect of increasing the hydrogen peroxide concentration on the rate. [1]

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(ii) Identify any suspect result by drawing a circle around the point on the graph. [1]

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(c) (i) Suggest a method, other than measuring the concentration of hydrogen peroxide, which the student could have used to follow this reaction. [1]

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(ii) State which main factor needs to remain constant in order to obtain good results in the experiment. [1]

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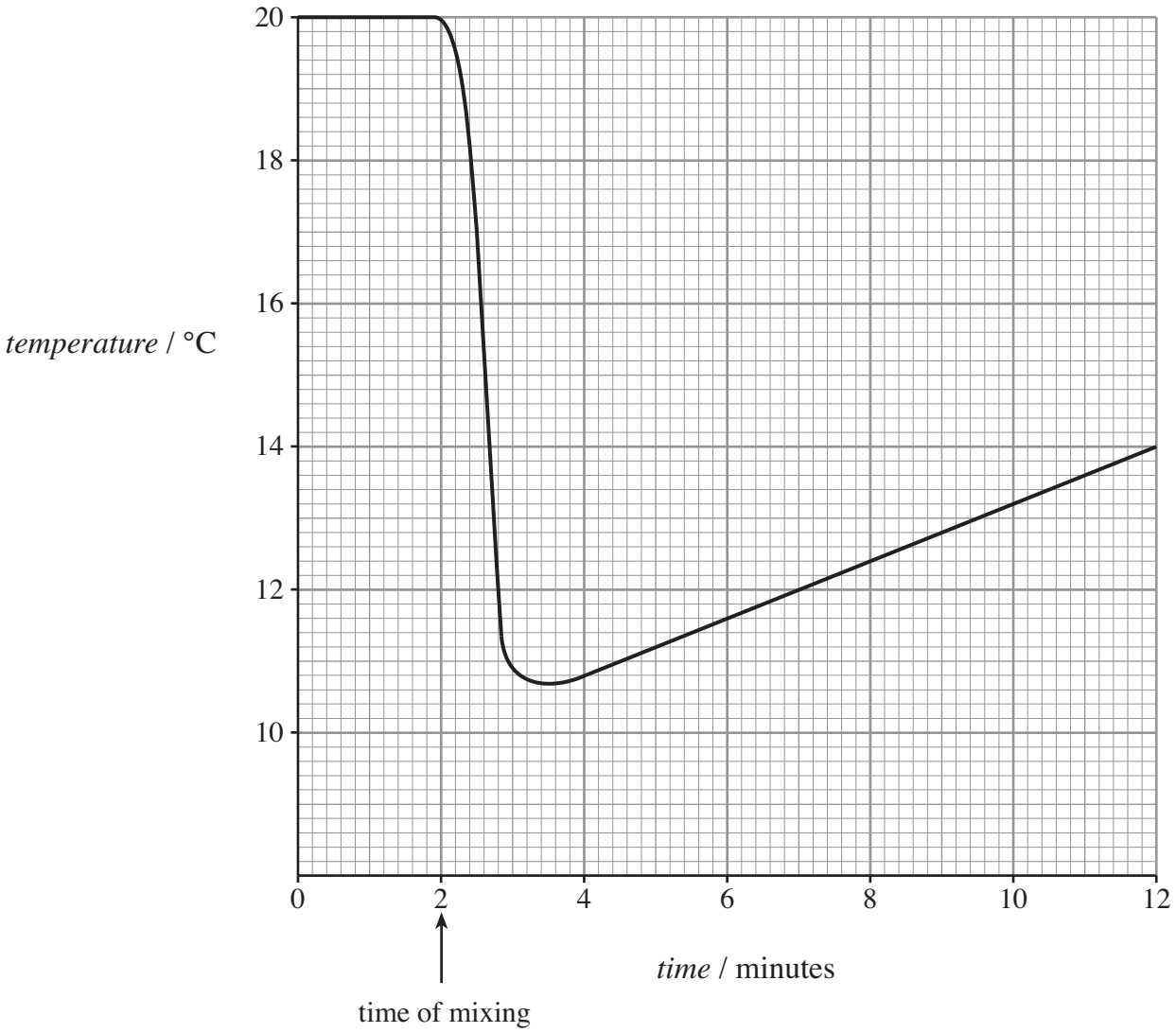
Total [9]

2. The graph below was obtained from a student experiment to determine the enthalpy change (ΔH) of solution of solid ammonium nitrate in water which used 50·0 g of water and 0·100 mol of ammonium nitrate.



(a) (i) Use the graph to estimate the maximum temperature **change** (ΔT). [2]

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(ii) Then calculate ΔH, using the equation

$$\Delta H = \frac{-4 \cdot 18 m \Delta T}{n} \text{ J mol}^{-1},$$

where m is the mass of water in grams and n is the number of moles of ammonium nitrate. [2]

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(b) State **two** common sources of error in this experimental procedure to determine enthalpy changes (ΔH) in solution. [2]

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Total [6]

3. A student determined the concentration of a solution of sulphuric acid by titrating it against a standard solution made by dissolving 10·6 g of sodium carbonate (M_r = 106) in distilled water to give 1 dm^3 of solution.

A burette was rinsed twice with small volumes of acid, filled to above the zero mark using a small funnel and the tap briefly opened while watching the burette jet.

The funnel was removed and the acid level brought **exactly** to the 0·00 cm^3 mark.

25·00 cm^3 of the sodium carbonate solution was placed in a conical flask with a suitable indicator and the acid added while swirling the flask contents.

When the indicator gave signs of change, the titration was halted, the flask walls washed with water and the titration continued, drop by drop, to the end-point.

Three titrations gave readings of 20·75, 20·00 and 20·20 cm^3, respectively.

(a) Answer the following questions on the procedure used.

(i) State why the burette was rinsed with the acid before filling. [1]

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(ii) State why the jet of the burette was looked at. [1]

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(iii) State why the funnel was removed. [1]

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(iv) State and explain whether there was any need for the acid level to be set exactly on zero. [1]

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(v) State why the flask contents were swirled during the titration. [1]

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(vi) State why the walls of the flask were washed down. [1]

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(vii) State why the acid was added drop by drop at the end. [1]

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(b) (i) Examine the titration data and decide on a mean value, giving an explanation, and estimate the error. [1]

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(ii) The equation for the acid/carbonate reaction is given below.

$$H_2SO_4 + Na_2CO_3 \longrightarrow Na_2SO_4 + CO_2 + H_2O$$

Use the data and results above to calculate the concentration of the acid solution. [3]

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Total [11]

Turn over for question 4

4. Outline the way in which a pure dry sample of the, almost insoluble compound, magnesium hydroxide, could be prepared by selecting from the compounds below.

Soluble:- barium hydroxide, barium nitrate, magnesium nitrate, magnesium sulphate.

Insoluble:- aluminium hydroxide, barium sulphate. [4]

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Total [4]

Rough Work