



General Certificate of Education
Advanced Subsidiary Examination
June 2011

Chemistry

CHM3T/Q11/TN

Unit 3T AS Investigative Skills Assignment

Teachers' Notes

Confidential

A copy should be given immediately to the teacher(s) responsible for
GCE Chemistry

Teachers' Notes**Confidential**

These notes must be read in conjunction with *Instructions for the Administration of Investigative Skills Assignment: GCE Chemistry* published on the AQA Website.

The determination of the enthalpy change for the reaction between copper(II) sulfate solution and iron.

Students are provided with a copper(II) sulfate solution and iron powder. The aim of this task is to measure the temperature rise for this reaction.

Materials

Each candidate should be provided with the following reagents in suitable closed containers.

Reagents	Concentration	Volume / mass	Note
Copper(II) sulfate solution	between 0.380 and 0.400 mol dm ⁻³ (between 95 and 100 g dm ⁻³ CuSO ₄ ·5H ₂ O)	125 cm ³	Labelled ' Copper(II) sulfate solution '
Iron powder		3.9 – 4.1 g	Labelled ' Iron powder '

This investigation has been trialled successfully by several teachers using the following material

Iron metal powder reduced
Griffin Education, Bishop Meadow Road, Loughborough, LE11 5RG
Tel. 01509 233344
<http://www.griffin-education.co.uk>

Iron metal powder reduced
Vickers Chemicals, Grangefield Industrial Estate, Richardshaw Road, Pudsey, West Yorkshire, LS28 6QW
Tel. 0113 236 2811
<http://www.viclabs.co.uk>

Materials from other suppliers may be used. The task must be trialled, however, whatever the source of supply.

General

It is the responsibility of the centre to ensure that the investigation works with the materials provided to the candidates before candidates carry out the task.

Reagents of good analytical quality should be used and spare supplies of all reagents specified in these notes must be available.

An ignition tube sealed with cling film is a suitable sealed container for the iron powder.

Apparatus

Each candidate will require the following:

Number	Apparatus
1	measuring cylinder (50 cm ³ or 100 cm ³)
1	analogue thermometer, measuring 0.2 °C or better, covering at least the range 0-50 °C
1	stirrer
1	plastic cup (of a size suitable to fit into a 250 cm ³ beaker)
1	250 cm ³ beaker
1	timer
	a plentiful supply of distilled or de-ionised water
	suitable eye protection

Checking the temperature reading

In the Task, candidates are instructed to have a temperature reading checked by their teacher in order to assess their ability to read the thermometer. If the candidate has not read the thermometer correctly, the teacher must tell the candidate the correct reading. This is to ensure that a candidate does not lose several accuracy marks because of incorrect temperature readings.

Teacher Result

A teacher must carry out the Task, the determination of the enthalpy change for the reaction between copper(II) sulfate solution and iron. Teacher results are required for **each** group of candidates.

The teacher's results, along with the Teacher Group, must be recorded in the space provided on the Teacher Results Sheet.

These results are needed by the teacher to assess the accuracy of each candidate's results. The teacher must **not** carry out the Task in the presence of the candidates.

In order to ensure that the appropriate Teacher Result can be matched with each candidate, teachers must ensure that candidates complete all the boxes on the Candidate Results Sheet, including 'Teacher Group'.

The Teacher Results Sheet(s) must be included with the sample sent to the moderator.

Centres with more than one teaching set

Centres may wish to divide their candidates into manageable groups and to conduct the Task at different times.

Candidates **must not** be given information about an ISA assessment until one week before Stage 1.

One week before Stage 1 candidates should be given the following information.

The aim of this task is to determine the enthalpy change for a reaction between copper(II) sulfate solution and iron.

The main areas of the specification in the Written Test are Section 3.2.1 (Energetics) and Section 3.2.5 (Group 7(17), the Halogens).

There **must** be no further discussion and candidates **must not** be given any further resources to prepare for the assessment.

ISA CHM3T/Q11 Teacher Results SheetCentre Number

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Teacher Name Teacher Group

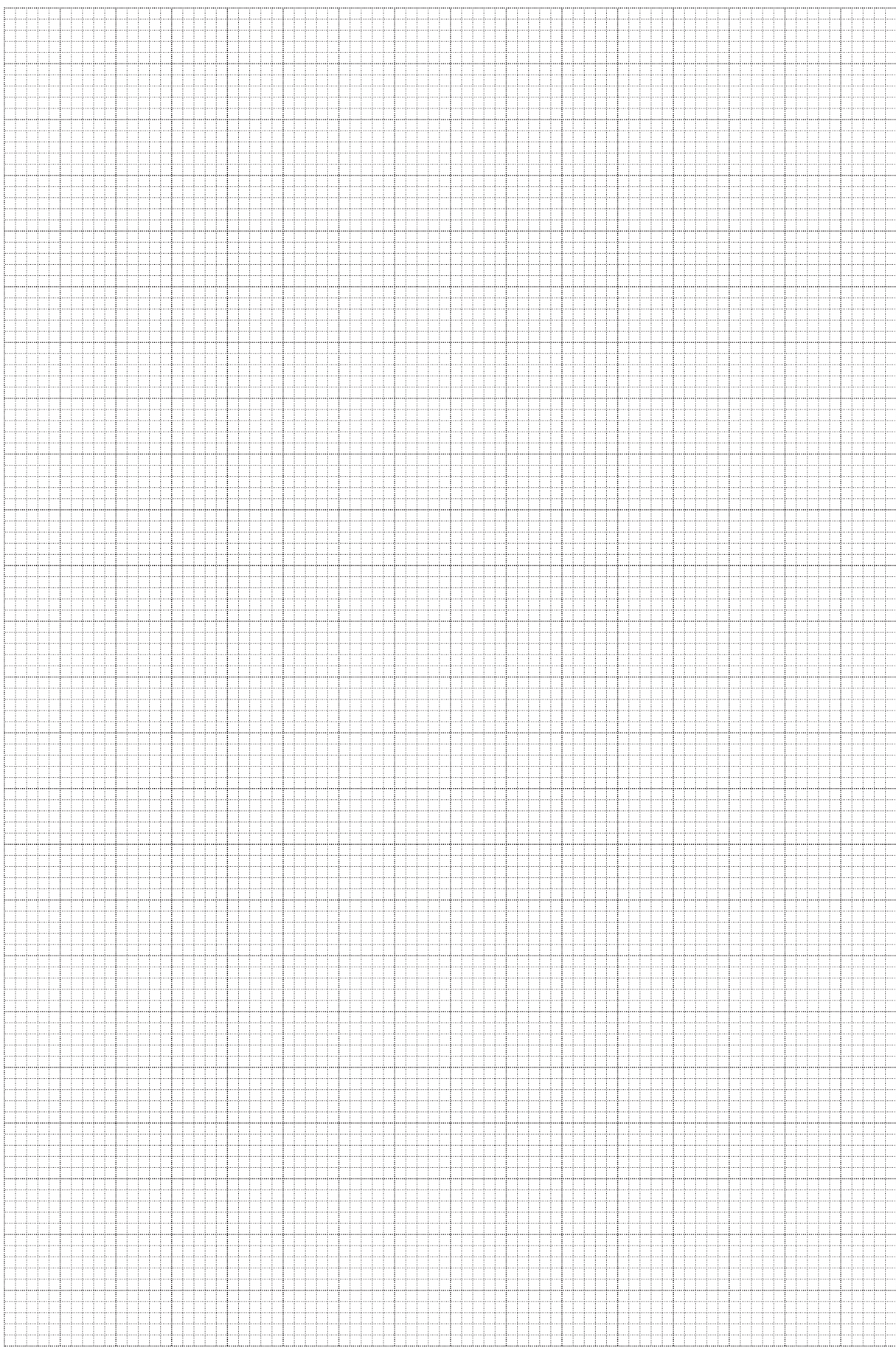
Results

Record your results in the table below.

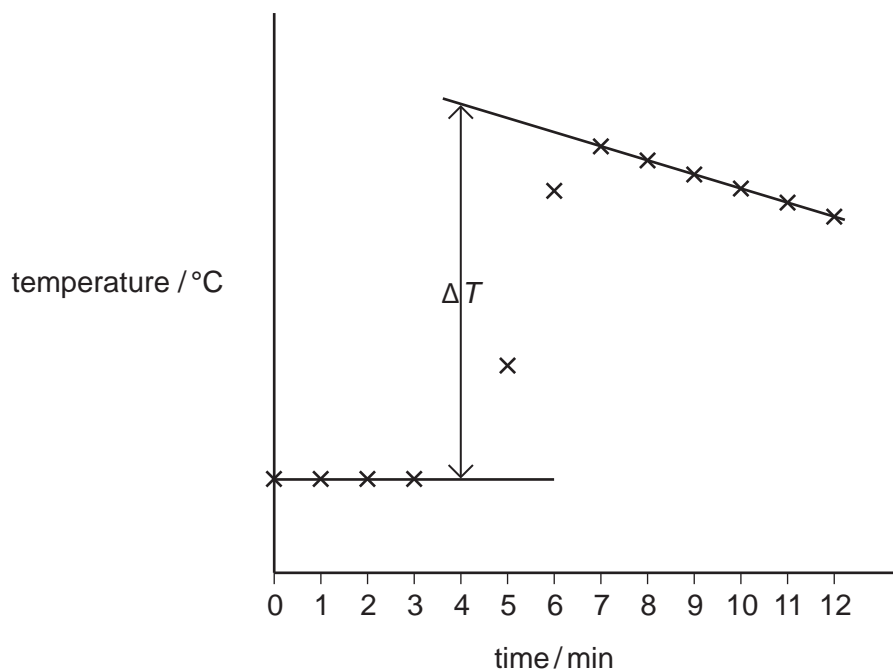
time / min	temperature / °C
0.0	
1.0	
2.0	
3.0	
4.0	
5.0	
6.0	
7.0	
8.0	
9.0	
10.0	
11.0	
12.0	

Plot a graph of **temperature** (y-axis) against **time** on the grid provided in order to determine the temperature rise at the fourth minute.

Turn over ►



Draw a line of best fit for the points before the fourth minute.
 Draw a second line of best fit for the points after the maximum temperature.
 Extrapolate both lines to the fourth minute.



Use your graph to determine a value for the temperature of the copper(II) sulfate solution at the fourth minute **before** mixing and for the temperature of the reaction mixture at the fourth minute **after** mixing.

Temperature at fourth minute before mixing / °C	
Temperature at fourth minute after mixing / °C	
Temperature rise / °C	