



ASSESSMENT and
QUALIFICATIONS
ALLIANCE

Mark scheme

June 2003

GCE

Chemistry

Unit CHM3/P

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Exercise 1

Mark scheme

Skill assessed **Implementing (2)**1. Points assessed by supervisor during the practical examination

(i) use of the pipette	1 empties under gravity	7 scoring points any 6 = 2 marks any 3 = 1 mark
	2 transfers from pipette without spillage	
	3 touches surface with pipette	
(ii) use of the burette	4 correct use of burette	
	(iii) use of the thermometer	
	6 stirs mixture	
(iv) general	7 does not require additional sample	

2. Points assessed from candidate's written report.

- (i) the **recording** of results
 results recorded clearly and in full in the table **1 mark**
Notes * *if you can read it, it is clear*
 * *full means completes row correctly, with no entry at 4 minutes*
- (ii) the awareness of **precision**
 temperatures recorded appropriately and consistently **1 mark**
Notes *precision* * *allow one error*
- (iii) The **accuracy** of the temperature rise, measured against a teacher value
 temperature rise is within 5% of target value **4 marks**
 temperature rise is within 8 % of target value **3 marks**
 temperature rise is within 10 % of target value **2 marks**
 temperature rise is within 15% of target value **1 mark**
Notes * *ensure temperature rise is determined correctly*
 * *if value entered by the candidate is wrong, underline the wrong value and write the correct value by the side*
 * *use the corrected value to assess accuracy*
 * *if staff value is wrong or missing use a group average; complete a discrepancy form*
 * *when calculating a group average ignore wild data*

Total 8 marks

CHM3/P

Exercise 1

Mark scheme

Skill assessed **Analysing (3)**

(a) the **plotting** of the **graph**

plots points for 0-4 minutes correctly

plots points for 5-10 minutes correctly

straight line through the points before addition

line through the points after addition is smooth

best fit

extrapolation back is a natural extension of the drawn line

reads the temperature rise correctly from the graph

7 scoring point

any 6 = 2 marks*

any 3 = 1 mark

* must include

correct extrap.

Notes

* *If graph does not cover **half** of the paper maximum score is 1 mark;
do not penalise again under nomenclature*

* *If the graph plot goes off the squared paper maximum score is 1 mark;
do not penalise again under nomenclature*

* *If axes unlabelled use data to decide that temperature is on y axis*

* *Allow **one** incorrectly plotted point*

* *“Correct extrapolation” means correct line to 4 minute ordinate*

Total 2 marks

Exercise 2

Mark scheme

Skill assessed **Analysing (3)**

Q1 temperature rise 11.2 - 11.4 °C **1 mark**

Q2 2.34 to 2.48 kJ allow answer in J

Q3 (a) 0.0191 mole

(b) 0.0200 mole

Q4 -122 to -125 kJ mol⁻¹

Notes * *Consequential marking from candidate's endpoint*

all 4 = 2 marks

any 2 = 1 mar

Q5 **errors**

balance	0.8%	4 scoring points any 3 = 1 mark
pipette	0.2%	
thermometer	0.9% based on 11.3°	
total error	1.9%	

Notes * *Allow errors to 2 or 3 dp, and overall error as integer or 2 or 3 dp*

* *Allow thermometer error on any of the temperatures from the table*

* *Consequential marking for overall error*

* *Penalise doubled errors **once***

* ***Lose mark** if answers wrong because (x 100) missing from calculations;
don't penalise again in awarding the nomenclature mark*

The appreciation of precision

quotes temp rise to 1 dp

quotes q to 3 significant figures

quotes molar enthalpy change to 3 significant figures

3 scoring points

any **2 = 1 mark****The correct use of nomenclature and terminology**

calculations clear with logical layout

uses terminology accurately

Notes * *Incorrect units mean the nomenclature mark is lost*

* *Don't penalise missing units*

2 scoring points

both = 1 mark**Total 6 marks**

Exercise 2

Mark scheme

Skill assessed **Evaluating (4)**

- Q1. ignores results at 5 and 8 minutes
other results on decent straight line
technique good/ results consistent or reliable
- Q2. difference is 97
97 against 219 is a 44.3% error
Notes * *Consequential marking from Q4 of Analysis*
* *Difference must be clearly stated, or appear in calculation*
* *Lose mark if the candidate answers a different question*
- Q3. appreciates heat loss main source of error
appropriate improvement to reduce heat loss eg more lagging
better calorimeter
- Q4 appropriate source of error eg original temperature of acid & unequal
temperature rise too small
reaction too slow
appropriate improvement eg equilibrates reagent temps
higher reagent concentrations
use excess zinc
Notes * *Do not penalise additional answers unless they contradict*

3 scoring points
any 2 = **1 mark**2 scoring points
both = 1 mark**1 mark****1 mark****1 mark****1 mark****Total 6 marks**

Exercise 3

Mark scheme

Skill assessed **Planning (1)**

- (a) the **scale** of working used
 appreciates 1:1 reaction
 realises alkali should be approx 0.05 mol dm^{-3} 2 scoring points
- (b) the **method** used
 rinses equipment
 pipette 25 cm^3 of standard sodium hydroxide into conical flask 12 scoring points
 adds acid solution from burette
 few drops of phenolphthalein
 dropwise at end point
 pink colour just disappears
 note burette reading
 swirls mixture
 repeats titration
 at least 2 concordant results
 any 2 standard precautions for an accurate result e.g. touch surface with
 pipette, fill jet space etc
Notes * *ignore additional apparatus unless contradictory - lose apparatus point(s)*
 * *if method is clearly unworkable CE means no points scored in this section*
- (c) the **use of results**
 averages concordant titres 4 scoring points
 calculate moles of NaOH
 calculate moles of acid
 calculates concentration of acid
- (d) the **appreciation of likely hazards and safety precautions**
 acid and alkali are corrosive max 2 scoring points
 uses a pipette filler
 eye protection

GRADING

20 scoring points	18 - 20 scores	8 marks
	16 - 17 scores	7 marks
	14 - 15 scores	6 marks
	12 - 13 scores	5 marks
	9 - 11 scores	4 marks
	6 - 8 scores	3 marks
	3 - 5 scores	2 marks
	1 - 2 scores	1 mark