edexcel

Mark Scheme (Results)
January 2012

GCE Chemistry (6CH07) Paper 01
Chemistry Laboratory Skills I (WA)

Edexcel and BTEC Qualifications
Edexcel and BTEC qualifications come from Pearson, the world's leading learning company. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information, please call our GCE line on 0844 576 0025, our GCSE team on 0844 576 0027, or visit our qualifications website at www.edexcel.com.

For information about our BTEC qualifications, please call 0844 576 0026, or visit our website at www.btec.co.uk.

If you have any subject specific questions about this specification that require the help of a subject specialist, you may find our Ask The Expert email service helpful.

Ask The Expert can be accessed online at the following link:
http://www.edexcel.com/Aboutus/contact-us/

Alternatively, you can contact our Science Subject Advisor directly by sending an email to ScienceSubjectAdvisor@EdexcelExperts.co.uk .

You can also telephone 0844 576 0037 to speak to a member of our subject advisor team.

(If you are calling from outside the UK please dial + 44 1204 770 696 and state that you would like to speak to the Science subject specialist).

Pearson: helping people progress, everywhere
Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

January 2012
Publications Code US030271

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. Questions labelled with an **asterix (*)** are ones where the quality of your written communication will be assessed.

Using the Mark Scheme

Examiners should look for qualities to reward rather than faults to penalise. This does NOT mean giving credit for incorrect or inadequate answers, but it does mean allowing candidates to be rewarded for answers showing correct application of principles and knowledge. Examiners should therefore read carefully and consider every response: even if it is not what is expected it may be worthy of credit.

The mark scheme gives examiners:
- an idea of the types of response expected
- how individual marks are to be awarded
- the total mark for each question
- examples of responses that should NOT receive credit.

/ means that the responses are alternatives and either answer should receive full credit.
( ) means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.
Phrases/words in **bold** indicate that the meaning of the phrase or the actual word is **essential** to the answer.
ecf/TE/cq (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

Candidates must make their meaning clear to the examiner to gain the mark. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct context.

Quality of Written Communication
Questions which involve the writing of continuous prose will expect candidates to:
- write legibly, with accurate use of spelling, grammar and punctuation in order to make the meaning clear
- select and use a form and style of writing appropriate to purpose and to complex subject matter
- organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.
Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question Number	Correct Answer	Reject	Mark
1 (a)	Lilac/purple/pale lilac (coloured flame) ALLOW mauve	Violet red	**1**

Question Number	Correct Answer	Reject	Mark
1 (b)	Iodide/I^- **(1)** Precipitate does not dissolve/does not disappear/is insoluble (in NH_3) /remains yellow/no change/no reaction **(1)**	Iodine Iodine ion, unless formula also given I, I_2	**2**

Question Number	Correct Answer	Reject	Mark
1(c)	(Aqueous bromine is) brown/red brown/yellow/orange/combination of these colours **(1)** (mixture is) darker (brown)/grey or black (solid) **(1)** Mark independently but the colour after adding bromine must be **darker** than the colour given for bromine. Eg bromine yellow brown, mixture brown scores **(2)** Bromine brown, mixture light brown scores **(1)** Bromine reddish brown, mixture brown scores **(2)** Iodine/I_2/I_3^- **(1)**	Just 'red' Purple/purple-black/colours with organic solvent Iodide/I/I^- Br^- and iodine	**3**

Question Number	Correct Answer	Reject	Mark
1(d)	Black solid is iodine/$\mathbf{I_2}$ **(1)** Yellow solid is sulfur/S/S_8 **(1)**	Iodide / I / I^-	**2**

Question Number	Correct Answer	Reject	Mark
2(a)	Sodium/Na^+	Na Sodium, Na	**1**

Question Number	Correct Answer	Reject	Mark
2(b)	Barium carbonate/$BaCO_3$ **(1)** Barium sulfate((VI))/$BaSO_4$ **(1)** Either order	SO_4^{2-} , CO_3^{2-} Barium sulfite Barium sulfate(IV) $BaSO_3$	**2**

Question Number	Correct Answer	Reject	Mark
2(c)	Carbonate/CO_3^{2-} **(1)** Carbon dioxide/CO_2 **(1)** For second mark allow a correct equation if state symbols show that carbon dioxide is the only gas	HCO_3^-	**2**

Question Number	Correct Answer	Reject	Mark
2(d)	Na_2CO_3 ALLOW TE from incorrect cation in (a) and/or incorrect anion in (c) Answer should follow from (a) and (c)	Sodium carbonate Any formula based on incorrect charges	**1**

Question Number	Correct Answer	Reject	Mark
3(a)	So that there is less (time for) cooling ALLOW so that reaction is fast/to increase the rate of reaction OR using lumps will be slow	To ensure all magnesium carbonate reacts Just "To make surface area larger"	**1**

Question Number	Correct Answer	Reject	Mark
3(b)(i)	(3.50/84) = 0.041667 = 0.0417/ 0.042/4.2 x 10^{-2} (mol) ACCEPT 3.50/84.3 = 0.041518 = 0.0415/0.042 (mol) Mark FINAL answer IGNORE sf except 1 sf IGNORE units	0.04, 0.041, 0.0416	**1**

Question Number	Correct Answer	Reject	Mark
3(b)(ii)	To ensure all magnesium carbonate reacts/ it is in excess/moles of acid is more than twice the number of moles of magnesium carbonate ALLOW To ensure all magnesium carbonate dissolves Statement that acid is in excess even if calculation not totally correct	To ensure all the acid reacts Calculation of number of moles without indication that acid is in excess To ensure there is enough/adequate acid There are more moles of acid than carbonate	**1**

Question Number	Correct Answer	Reject	Mark
3(c)(i)	(50 x 4.18 x 8.7) = 1818.3 = 1820/ 1818/1800 (J**)** accept 1.8183 = 1.82 **kJ** IGNORE sf except 1 sf IGNORE signs	2000 (J) 53.5 x 4.18 x 8.7 = 1945.58	**(1)**

<table>
<tr><th>Question Number</th><th>Correct Answer</th><th>Reject</th><th>Mark</th></tr>
<tr><td>3(c)(ii)</td><td>
First mark:
Answer in (c)(i)/number of moles (1)

Second mark:
Correct value with negative sign and 3sf (1)
Correct answer with no working scores (2)

= -43.6 (kJ mol^{-1})

ACCEPT answers from -43.3 up to -45.5 which may arise from using different roundings, but check they come from values in (c)(i) and a suitable number of moles.

<table>
<tr><td>1818.3</td><td>0.042</td><td>43.3</td></tr>
<tr><td>1818.3</td><td>0.04</td><td>45.5</td></tr>
<tr><td>1818.3</td><td>0.041667</td><td>43.6</td></tr>
<tr><td>1818</td><td>0.041667</td><td>43.6</td></tr>
<tr><td>1820</td><td>0.041667</td><td>43.7</td></tr>
<tr><td>1818.3</td><td>0.0417</td><td>43.6</td></tr>
<tr><td>1818</td><td>0.0417</td><td>43.6</td></tr>
<tr><td>1820</td><td>0.0417</td><td>43.6</td></tr>
<tr><td>1818.3</td><td>0.041518</td><td>43.8</td></tr>
<tr><td>1818</td><td>0.041518</td><td>43.8</td></tr>
<tr><td>1820</td><td>0.041518</td><td>43.8</td></tr>
<tr><td>1818.3</td><td>0.0415</td><td>43.8</td></tr>
<tr><td>1818</td><td>0.0415</td><td>43.8</td></tr>
<tr><td>1820</td><td>0.04</td><td>45.5</td></tr>
<tr><td>1820</td><td>0.0417</td><td>43.6</td></tr>
<tr><td>1820</td><td>0.0415</td><td>43.9</td></tr>
</table>

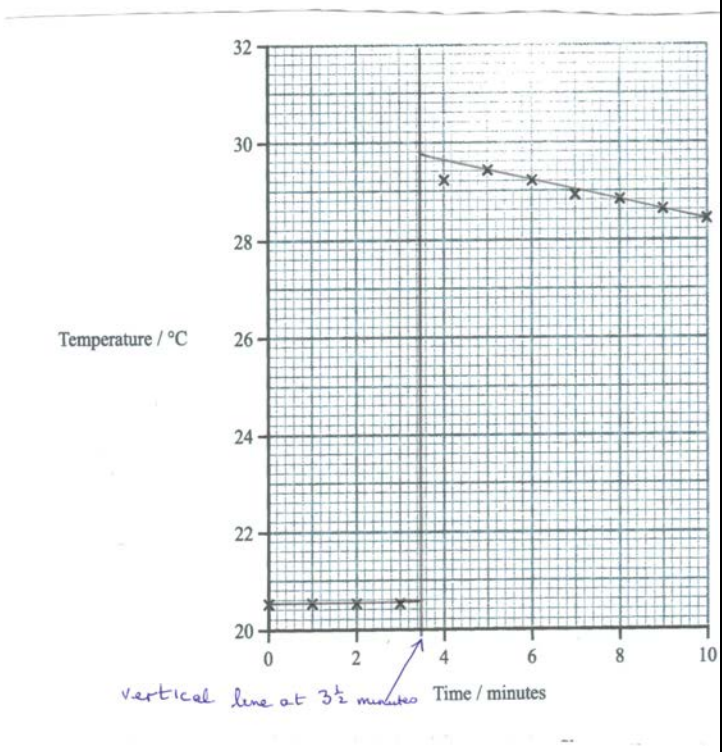
Answer to c(i) divided by one (for one mole of magnesium carbonate) scores second mark only, if sign and sf correct and in kJ mol^{-1}
</td><td></td><td>2</td></tr>
</table>

Question Number	Correct Answer	Reject	Mark
3(d)(i)	Pipette : more accurate/more precise/lower % error **(1)** Measuring cylinder : faster/easier/more convenient **(1)**	Cost Safer Measures a range of volumes/ larger volumes Easier to clean More suitable	**2**

Question Number	Correct Answer	Reject	Mark
3(d)(ii)	$\frac{(0.01 \times 100)}{3.50}$ = (±)0.28571 = (±) 0.286/ (±)0.29/ (±)0.3 % IGNORE sf	0.285, 0.28	**1**

	Correct Answer	Reject	Mark
3(e)(i)	(calculated) enthalpy change less negative/less exothermic **(1)** allow (value) less or smaller or decreases (Temp rise will be lower) due to heat loss/more heat absorbed by calorimeter **(1)** Mark independently		**2**

Question Number	Correct Answer	Reject	Mark
3(e)(ii)	(calculated) enthalpy change less negative/less exothermic **(1)** allow (value) less or smaller or decreases Less $MgCO_3$ to react (so temp rise will be lower) **(1)** Mark independently	Water will not affect the reaction	**2**

Question Number	Correct Answer	Reject	Mark
3(f)(i)	 Extrapolated horizontal line, extrapolated (best fit) cooling line and vertical line at 3.5 minutes **(1)** 9.3°C ±0.2 **(1)** Mark independently	Diagonal line from 3 or 3.5	**2**

Question Number	Correct Answer	Reject	Mark
3(f)(ii)	Corrects for (loss of heat during) cooling/checks original solution is at equilibrium with surroundings IGNORE reference to anomalous readings	There is no heat loss The original method included heat loss to the surroundings	1

Question Number	Correct Answer	Reject	Mark
4(a)	Sodium dissolves/disappears/gets smaller **(1)** Bubbles/effervescence/fizzes **(1)** White solid (Allow white precipitate) remains / forms on surface of sodium **(1)** Mixture gets hot **(1)** Any TWO	Sodium melts Sodium sinks Gas/hydrogen given off Makes hissing sound Lighted splint held above mixture gives a pop	**2**

Question Number	Correct Answer	Reject	Mark
4(b)	Measure volume of gas in **fixed time**/measure time to collect a volume of gas/measure time for sodium to dissolve	Just time Just volume Just temperature	**1**

Question Number	Correct Answer	Reject	Mark
4(c)(i)	Steamy/misty (fumes) ALLOW white (fumes)	White smoke White solid	**1**

Question Number	Correct Answer	Reject	Mark
4(c)(ii)	White smoke White solid ALLOW **White** smoky fumes	Steamy/misty fumes White fumes	**1**

Question Number	Correct Answer	Reject	Mark
5(a)	Potassium dichromate ((VI))/ $K_2Cr_2O_7$ Sodium dichromate ((VI))/ $Na_2Cr_2O_7$ IGNORE acidified/solution/aqueous	Dichromate ((VI)) ions/$Cr_2O_7^{2-}$ Potassium manganate(VII)/ $KMnO_4$	**1**

Question Number	Correct Answer	Reject	Mark
5(b)	Orange to green/blue/blue-green/ brown	yellow	**1**

Question Number	Correct Answer	Reject	Mark
5(c)	Flask fitted with condenser in vertical position **(1)** Direction of water flow in condenser **(1)** Heat not required IGNORE contents	Stoppered equipment and/ or gaps between flask and condenser loses first mark	**2**

Question Number	Correct Answer	Reject	Mark
5(d)	Any two of Yield would be reduced/reactants and or products would be lost **(1)** complete **oxidation** could not occur **(1)** Vapour is flammable/toxic/ hazardous/harmful/ acidic/irritant **(1)**	To increase (%) yield To prevent boiling dry To allow reaction to go to completion Reactant / product is very volatile	**2**

Question Number	Correct Answer	Reject	Mark
5(e)	Any one from Mixture being heated returns to the flask The vapour is (cooled and) condensed The water in the condenser is cold (and flowing)		**1**

Question Number	Correct Answer	Reject	Mark
5(f)(i)	(Anhydrous) calcium chloride/ (Anhydrous) magnesium sulfate/ (Anhydrous) sodium sulfate ALLOW Silica gel ACCEPT formula	Calcium oxide Conc sulfuric acid Aluminium chloride Potassium sulfate Copper sulfate Cobalt chloride Calcium carbonate	**1**

Question Number	Correct Answer	Reject	Mark
5(f)(ii)	Filter paper absorbs some of the product ALLOW Some product is absorbed BY/ INTO filter paper Answer should be appropriate for collection of a liquid product, not a solid	Transfer losses Spillage Product sticks to filter paper Some product is left ON filter paper Decanting is faster	**1**

Question Number	Correct Answer	Reject	Mark
5(g)(i)	Mol propanol = (10/60.1) = 0.166/ 0.17 = (mol propanoic acid) (1) Mass propanoic acid = (0.166 x 74.1) = 12.32945 = 12.33/12.3 (g) If 0.17 mol then 12.597/12.6 (g) **(1)** If molar masses are reversed, 8.1066 (g) scores **(1)** IGNORE sf except 1 sf Correct answer no working **(2)** marks		**2**

Question Number	Correct Answer	Reject	Mark
5(g)(ii)	Mass propanoic acid = 6 x 0.99 = 5.94 (g) **(1)** % yield = (5.94/ 12.33)x100 = 48.17% = 48/ 48.2/48.18 % **(1)** Allow 48.29 (if 12.3 used) 47.14 (if 12.6 used) **(1)** Allow calculation based on volumes: 12.33g propanoic acid = 12.33/0.99 = 12.455 cm^3 **(1)** % yield = (6.0/ 12.455)x100 = 48.17 % IGNORE sf except 1 sf Correct answer no working **(2)** marks TE from (i) If molar masses are reversed, 73.24%		**2**

Question Number	Correct Answer	Reject	Mark
5(h)	(Product) Propanal/CH_3CH_2CHO/ C_2H_5CHO **(1)** ALLOW propan-1-al Product removed as formed/ Incomplete oxidation/only partial oxidation occurs **(1)**	Molecular formulae Formulae written with OH Reaction does not go to completion	**2**

TOTAL FOR PAPER = 50 MARKS

Further copies of this publication are available from
International Regional Offices at www.edexcel.com/international

For more information on Edexcel qualifications, please visit
www.edexcel.com

Alternatively, you can contact Customer Services at
www.edexcel.com/ask or on + 44 1204 770 696

Pearson Education Limited. Registered company number 872828
with its registered office at Edinburgh Gate, Harlow, Essex CM20 2JE

Ofqual

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

Rewarding Learning

6CH07_01
1201