www.dynamicpapers.com



Mark Scheme (Results)

October 2018

Pearson Edexcel International
Advanced Level
In Chemistry (WCH06)
Paper 01 Chemistry Laboratory Skills II

www.dynamicpapers.com

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. 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 our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

October 2018
Publications Code WCH06_01_1810_MS*
All the material in this publication is copyright
© Pearson Education Ltd 2018

www.dynamicpapers.com

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.

www.dynamicpapers.com

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.

www.dynamicpapers.com

Question Number	Answer	Reject	Mark
1 (a)(i)	Observation with copper(II) sulfate **and** with copper(II) hydroxide: (Dissolves to form a) blue solution Allow Blue-green solution Ignore just blue solid	 Green / yellow solution	1

Question Number	Answer	Reject	Mark
1 (a)(ii)	Observation with copper(II) sulfate: White precipitate/solid/crystals **and** Observation starting with copper(II) hydroxide: No change/No precipitate/Remain blue (solution) ALLOW No observation/No reaction If both copper(II) sulfate observations are correct, then 1 mark out of two for parts (i) and (ii)	 Solid dissolves Just 'No'	**1**

Question Number	Answer	Reject	Mark
1 (b)(i)	(Observation) Pink (solution) ALLOW Shades of pink **(1)** (Inference) $[Co(H_2O)_6]^{2+}$ ALLOW $[Co(H_2O)_4]^{2+}$ **(1)** IGNORE lack of square brackets Mark independently	 Purple $[Co(H_2O)_6Cl_2]^{2+}$ Just Co^{2+} $Co^{2+}(aq)$	**2**

www.dynamicpapers.com

Question Number	Answer	Reject	Mark
1 (b)(ii)	(To an aqueous solution) Add nitric acid/HNO_3 **and** silver nitrate/$AgNO_3$ (solution) If name and formula given, then both must be correct ALLOW reagents to be given in either order but not after the white ppt observation **(1)** White precipitate/solid IGNORE Addition of aqueous ammonia **(1)** ALLOW To the solids Add concentrated sulfuric acid/H_2SO_4 **(1)** Steamy/Misty fumes **(1)** OR ALLOW To the solids Add acidified manganate(VII) **(1)** Bubbles (of chlorine gas) **(1)**	Use of HCl scores (0)	**2**

Question Number	Answer	Reject	Mark
1 (c)	(Acidified / H^+) MnO_4^- / (Acidified / H^+ potassium) manganate((VII)) / permanganate ALLOW (H_2SO_4) $KMnO_4$ **(1)** $E^{\ominus}_{cell}$ = (+) 0.51(V) No TE on incorrect reagent **(1)**	Additional reagents K_2MnO_4 0.5 −0.51	2

Question Number	Answer	Reject	Mark
1 (d)(i)	$VOSO_4.4H_2O$/ $VOSO_4.3H_2O$/ $VOSO_4.2H_2O$/ $VOSO_4.H_2O$ ALLOW $VOSO_4.5H_2O$	$VOSO_4$	1

www.dynamicpapers.com

Question Number	Answer	Reject	Mark
1 (d)(ii)	Not all of the water (of crystallisation) had been removed (from some of the sample) OR (More) water evaporates / was driven off ALLOW Steam given off	Loss of O_2	1

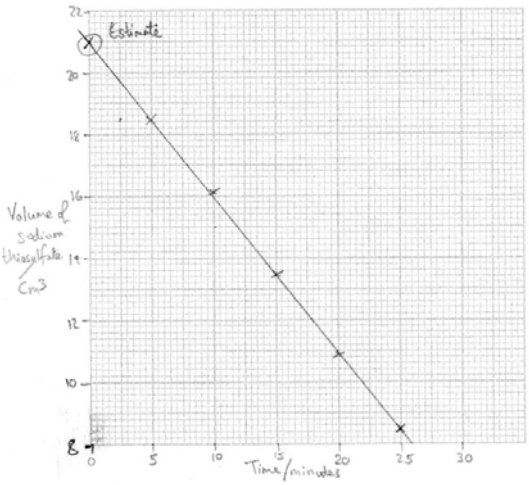
Question Number	Answer	Reject	Mark
1 (d)(iii)	Molar mass = 253 (g mol^{-1}) **(1)** % water of crystallisation = % loss in mass = 100 x 90/253 = 35.573/ 35.57/35.6/36 (%) Ignore SF except 1 TE on molar mass provided % loss is less than 100 **(1)** Correct final answer without working scores **(2)**		2

(Total for Question 1 = 12 marks)

www.dynamicpapers.com

Question Number	Acceptable Answers	Reject	Mark
2(a)	The solid needs to dissolve in the reaction mixture (before it can quench) ALLOW The reaction is quenched/stopped by the solution quicker Ignore references to just 'surface area greater' ALLOW Comparison of the reaction rate of the solid being slower to that of the solution		1

Question Number	Acceptable Answers	Reject	Mark
2(b)(i)	(Estimated volume) 20.9(0) to 21.1(0) (cm^3) Answer to 1dp ALLOW Range within that stated above, such as 20.9(0) – 21.0(0)	21	1

Question Number	Acceptable Answers	Reject	Mark
2(b)(ii)	**Graph M1** Axes correct with sensible scales so at least half of the graph paper on both axes is covered **(1)** **Graph M2** Axes labels fully correct with units ALLOW Volume/cm^3 **(1)** **Graph M3** All points plotted correctly (±1 small square) and straight line **(1)** Example graph  	Just 'V/cm^3' T for time	3

www.dynamicpapers.com

Question Number	Acceptable Answers	Reject	Mark
2(b)(iii)	(Gradient numerical value) = (−) 0.48 to 0.52 **(1)** IGNORE SF (Gradient units) = $cm^3\ min^{-1}$ ALLOW cm^3 / min **(1)** ALLOW (−) 8.33 x 10^{-3} $cm^3\ s^{-1}$ for two marks		2

Question Number	Acceptable Answers	Reject	Mark
2(c)	O / zero / zeroth (order) **and** because the graph is a straight line OR Rate/gradient is constant OR rate doesn't depend on iodine concentration/volume	Positive gradient / Concentration is proportional to time	1

Question Number	Acceptable Answers	Reject	Mark
2(d)	If the time is known (accurately) then it can still be plotted correctly/The actual time doesn't matter as long as it is known (accurately)		1

Question Number	Acceptable Answers	Reject	Mark
2(e)	There is insufficient volume of the reaction mixture left in the flask (to pipette exactly 10.0 cm^3) Ignore there is only 60 cm^3 of reaction mixture **(1)** **EITHER** Add sodium hydrogencarbonate directly to the flask with the reaction mixture (and then titrate the mixture)/ Titrate the remaining reaction mixture (in the flask) ALLOW Pour the (remaining) reaction mixture into the sodium hydrogencarbonate solution **OR** Use a 5 cm^3 pipette and double the titre value **(1)**	References to 8.50 cm^3	2

www.dynamicpapers.com

Question Number	Acceptable Answers	Reject	Mark
2(f)	Temperature **(1)** Water bath ALLOW Other suitable lab equipment which would control the temperature/ice-water mixture/oil bath No TE on other factors Ignore references to thermometers/ thermostatically controlled rooms/air-conditioning **(1)**	Heat	2

(Total for Question 2 = 13 marks)

Question Number	Acceptable Answers	Reject	Mark
3(a)(i)	Results are not concordant/not within 0.1(0) cm^3 / not within 0.2(0) cm^3		1

Question Number	Acceptable Answers	Reject	Mark
3(a)(ii)	Colourless to (pale) pink ALLOW Yellowy brown for starting colour	Clear Red Purple Magenta	1

Question Number	Acceptable Answers	Reject	Mark
3(a)(iii)	The colour of the apple juice (will make the colour change at the end-point difficult to determine) ALLOW Cloudiness/Not clear / any sensible colour for apple juices such as green or brown		1

www.dynamicpapers.com

Question Number	Acceptable Answers	Reject	Mark
3(a)(iv)	Method 1 Number of moles of OH^- =(0.100 x 0.01680=) 1.68×10^{-3} (mol) **(1)** Number of moles of malic acid = ($1.68 \times 10^{-3} \div 2$ =) 8.40×10^{-4} (mol) **(1)** Concentration of malic acid = ($8.40 \times 10^{-4} \div 0.025$= = $3.36 \times 10^{-2} / 0.0336$ =) = $3.4 \times 10^{-2} / 0.034$ (mol dm^{-3}) **(1)** OR Method 2 Step 1: Volume ratio 16.8/25 **(1)** Step 2: Multiply by 0.100 **(1)** Step 3: Multiply by ½ to give $3.4 \times 10^{-2} /$ 0.034 (mol dm^{-3}) **(1)** Correct answer to 2SF without working scores **(3)** If units given, then they must be correct ALLOW TE from each step of the calculation	Any answer not to 2 SF Any answer not to 2 SF mol/dm^{-3}	3

Question Number	Acceptable Answers	Reject	Mark
3(a)(v)	The mean titre would be 25.2(0) cm^3 / 2.52×10^{-2} dm^3 **(1)** There are three (carboxylic) acid groups in isocitric acid **and** compared to two in malic acid **(1)** ALLOW for 1 mark the titre would be greater because there is one more (carboxylic) acid groups in isocitric acid ALLOW for 1 mark the titre would be $\frac{3}{2}$ greater if no other mark awarded	One more OH group	2

www.dynamicpapers.com

Question Number	Acceptable Answers	Reject	Mark
3(b)(i)	Triplet / three splits / split into three ALLOW Just '3' / 1:2:1 / triple **and** the adjacent carbon has two hydrogen atoms but ignore just (n+1) rule unless explained ALLOW **and** there are two adjacent hydrogen atoms		1

Question Number	Acceptable Answers	Reject	Mark
3(b)(ii)	Two/2 (peaks)		1

Question Number	Acceptable Answers	Reject	Mark
3(b)(iii)	$(CH_3)_4Si$/Tetramethylsilane ALLOW TMS If formula and name given, then both must be correct	$SiCl_4$ TMC	1

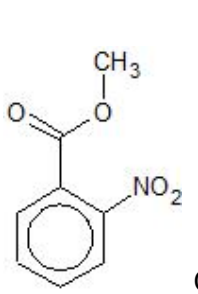
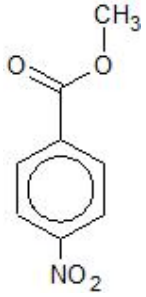
Question Number	Acceptable Answers	Reject	Mark
3(c)(i)	$COOH^+$/CO_2H^+	Just 'displayed formula'	1

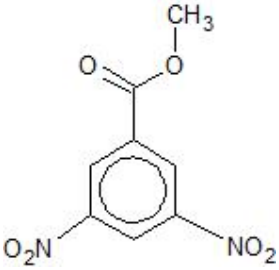
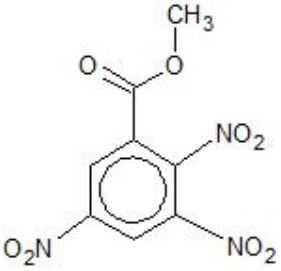
Question Number	Acceptable Answers	Reject	Mark
3(c)(ii)	$C_3H_5O_3^+$ ALLOW the atoms in any order	Just 'structural/ displayed/ skeletal formulae'	1

(Total for Question 3 = 13 marks)

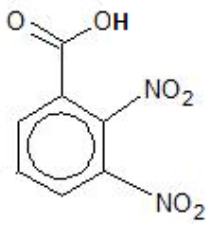
www.dynamicpapers.com

Question Number	Acceptable Answers	Reject	Mark
4(a)	Ice cubes have limited/less surface area/less touching area/ less contact for cooling Accept reverse argument IGNORE Cooling is more efficient/cooling is faster		1

Question Number	Acceptable Answers	Reject	Mark
4(b)(i)	Nitration of the ring at position 2 or 4  OR 	Nitration of any other part of the molecule Multi-nitrations	1

Question Number	Acceptable Answers	Reject	Mark
4(b)(ii)	Any further-substituted product, such as di-nitrated  Or Tri-nitrated  Accept substitution at any or all of the five available positions ALLOW Hydrolysed ester, eg	Nitration of methyl group	1

www.dynamicpapers.com

Question Number	Acceptable Answers	Reject	Mark
4(c)	Any two from (Modification 1) perforation**s** / hole**s** in the Buchner funnel need to be shown **(1)** (Modification 2) One of the tubes from the tap should go straight down (to create suction) and a second tube should go to the sidearm of the Buchner flask ALLOW Replace attachment to tap with to vacuum/ pump/suction pump **(1)** (Modification 3) Filter paper should be trimmed so that it does not go up at the sides of the funnel **(1)** Diagrams of modifications alone or to support descriptions can be awarded credit		2

www.dynamicpapers.com

Question Number	Acceptable Answers	Reject	Mark
4(d)	**M1** Dissolve in the **minimum**/small volume of **hot**/**boiling** ethanol / solvent ALLOW Add ethanol and dissolve, heat to evaporate some ethanol to produce a saturated solution / crystals form on the end of a glass rod **(1)** Ignore reference to hot filtration **M2** Cool in an ice bath (to form the crystals) ALLOW Leave to cool/Allow to cool **(1)** **M3** Filter using vacuum filtration/suction filtration/ Buchner funnel (to remove soluble impurities) Ignore 'wash with cold solvent' **(1)** **M4** Dry (crystals) between two pieces of filter paper/ (pat) dry with filter paper in a desiccator/ in a cool or warm oven **(1)**	Use of water as solvent/ Just 'dissolve and then heat' Wash with (cold) water Just 'oven' / Add a drying agent	4

Question Number	Acceptable Answers	Reject	Mark
4(e)	n(methyl benzoate)= 2.0 ÷ 136 = 0.0147.. (mol) **(1)** = n(methyl 3-nitrobenzoate) m(methyl 3-nitrobenzoate) = 0.0147.. x 181 = 2.66.. (g) so 73% = 2.66.. x 0.73 = 1.943/1.94/1.9 (g) **(1)** Correct answer without working scores **(2)** Ignore SF except 1	Intermediate rounding to 1SF	2

www.dynamicpapers.com

Question Number	Acceptable Answers	Reject	Mark
4(f)	The range would start at a lower temperature / OR The range would be wider/larger ALLOW Range given as numbers provided the highest temperature stated is not >80°C and the lowest is not <70°C	Temperatures would be raised Just 'wide'/ 'large'	1

(Total for Question 4 = 12 marks)

Total for Paper = 50 marks

www.dynamicpapers.com

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom