OXFORD

INTERNATIONAL
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INTERNATIONAL A-LEVEL
CHEMISTRY
9620

Unit 5 Practical and synoptic

Mark scheme

January 2019

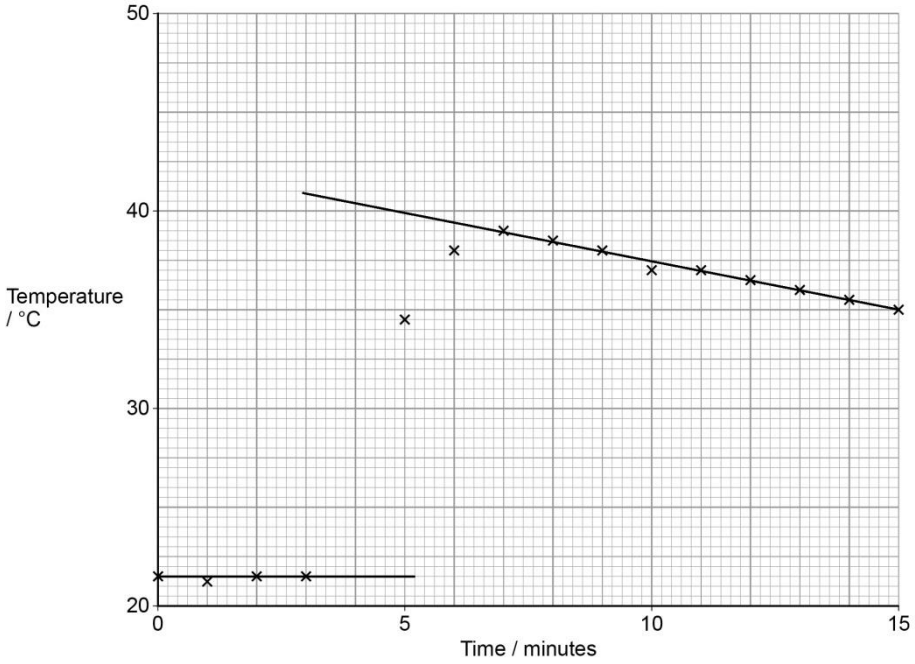
Version: 1.0 Final

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk

Question	Marking guidance	Mark	Comments
01.1	to mix the reactants or to spread the magnesium/powder	1	Allow to speed up the reaction
01.2	n(Mg) $\frac{3.72}{24.3}$ = 0.153 mol $n(Zn(NO_3)_2)$ $0.0300 \times 1.58 = 0.0474$ mol ∴ magnesium is in excess	1 1	Award 1 mark if both calculations correct but reagent in excess not identified

01.3	both best fit lines correct extrapolations to t = 4.0 minutes temperature change calculated as 40.5 – 21.5 = 19.0 (°C)  	1 1 1	Do not allow doubled or kinked lines

01.4	$n(CuSO_4)$ $= 0.0500 \times 0.500 = 0.0250$ mol $Q = 50.0 \times 4.18 \times 19.5 = 4076$ J $\Delta H = \frac{-4.076}{0.0250} = -163$ (kJ mol^{-1})	1 1 1	+ 163 kJ mol^{-1} = 2 marks

Total		**9**	

Question	Marking guidance	Mark	Comments
02.1	the CH_3 group can be in different positions on the (aromatic) ring	1	
02.2	no NaOH left or the acid is now in excess	1	
02.3	(minimum volume of hot solvent) to obtain saturated solution OR to increase yield (of acid) OR to reduce amount of acid left in solution OR to enable crystallisation (on cooling) (filter the hot solution) to remove insoluble impurities OR to prevent crystals forming (during filtration) (in an ice bath) to obtain more crystals OR decrease solubility of solid (wash with cold solvent) to remove soluble impurities	1 1 1	
02.4	filtration is quicker product is drier	1 1	Accept solid would crystallise before filtration complete Either order

02.5	melting point lower than correct value melts over a range of temperature	1 1	

Total		**12**	

Question	Marking guidance	Mark	Comments
03.1	(ammonium chloride) pipette AND (sodium hydroxide) burette	1	Do not accept dropping pipette
03.2	to ensure all reactants washed into (reaction) mixture no effect on amount/moles of either reactant or water is not a reagent	1 1	
03.3	pH change gradual/not vertical at end point indicator colour change needs many drops or range of volume of NaOH(aq) needed	1 1	Mark independently
03.4	pH = 11.8 $[H^+] = 10^{-11.8} = 1.58 \times 10^{-12}$ mol dm^{-3} OR pOH = 14 – 11.8 = 2.2 $[OH^-] = 1.0 \times 10^{-14} \div 1.58 \times 10^{-12}$ OR $[OH^-] = 10^{-2.2}$ $= 6.3 \times 10^{-3}$ (mol dm^{-3})	1 1 1	Allow range 11.6 to 12.0

03.5	after addition of 5.00 cm^3 of NaOH M1: pH = pK_a = 9.3 M2: $K_a = 10^{-9.3}$ M3: = 5.0×10^{-10} mol dm^{-3} OR initial pH = 4.6 M1: $[H^+] = 2.5 \times 10^{-5}$ mol dm^{-3} M2: $K_a = \frac{[NH_3][H^+]}{[NH_4^+]} = \frac{(2.5 \times 10^{-5})^2}{1.00}$ M3 = 6.3×10^{-10} mol dm^{-3}	 1 1 1 or 1 1 1	

Total		**11**	

Question	Key
4	C
5	B
6	B
7	D
8	A
9	A
10	C
11	A
12	C
13	A
14	B
15	D
16	D
17	D
18	A

Question	Key
19	D
20	D
21	B
22	C
23	C
24	D
25	B
26	D
27	A
28	C
29	A
30	B
31	C
32	B
33	C