01. 0620_m15_ms_62 Q: 4

(d) Table of results

total volume of water boxes completed correctly (1),

10, 12, 14, 18

temperature boxes completed (2)
all 4 correct (2)
3 correct (1)
2 or fewer correct (0)

91, 73, 65, 54 [3]

(e) appropriate scale for y axis (1)
note: must use at least 4 large squares vertically to plot points

all points correctly plotted (3),
all 4 correct (3)
3 correct (2)
2 correct (1)
1 or fewer correct (0)
note: origin should not be included

smooth line graph (1) [5]

(f) value from graph for 20 cm^3 water, 50–53 (1) ± half a small square

shown clearly by extrapolation (1)

unit, °C (1) [3]

(g) clear / colourless liquid forms / no solid / crystals / salt visible (1) [1]

(h) salt would not all dissolve (1)

use of figures (1) [2]
e.g. only 5.7 g would dissolve in 10 cm^3 water at 100 °C

(i) sketch graph always above line (1)

label (1) [2]

(j) any **one** improvement from: (1)

do not remove thermometer from solution
use IT method / second person to note formation of crystals
repeat
do separate experiments
use smaller volumes of water
evaporation

linked explanation (1)

loss of solid on thermometer
observing formation of first crystals may vary
average
more results to plot on graph
method of avoiding evaporation e.g. separate experiments, lid [2]

0620_s12_ms_6Q: 4

(a) Table of results **ignore**: units in table
volume of aqueous potassium chloride boxes completed correctly (1) 1, 2, 4. 5, 6, 7
heights of solid boxes completed ±1mm (2) 4, 8, 16, 20, 24, 24
in mm (1) [4]

(b) all points correctly plotted (2), –1 for any incorrect
straight line graphs (2) **note**: one for each line, doesn't have to go through origin [4]

(c) value from graph 14 (1) unit (1) shown clearly (1) [3]

(d) precipitation (1) **allow**: double decomposition ignore: exo/endothermic [1]

(e) **(i)** same (1) no ecf **not**: almost the same
all lead nitrate reacted/reaction finished/lead nitrate is limiting factor (1) [2]

(ii) same heights/owtte (1)
lead nitrate is limiting factor/same amount of lead nitrate/excess potassium chloride (1) [2]

(g) yellow (precipitate) (1) [1]

(h) improvement (1) e.g. use burette/pipette/leave solid to settle longer/repeat
explanation (1) e.g. instead of a measuring cylinder/heights more accurate/take average [2]

[Total: 19]

03. 0620_s12_ms_62 Q: 1

(a) beaker (1) [1]

(b) any through tube with (only) two open ends (1)
outer tube with 'water' labelled and a way in and out (1) [2]

(c) turns red/pink (1)
reversible/rehydration/owtte/$CoCl_2$ going pink is the test for water (1) [2]

(d) water condensed at top of tube (1)
runs back onto hot tube/water onto $CoCl_2$ generates heat/owtte (1) **not**: suck back [2]

[Total: 7]

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04. 0620_s12_ms_63 Q: 4

(a) pipette/burette (1) [1]

(b) **(i)** methyl orange/phenolphthalein/litmus (1) **not**: Universal Indicator

(ii) yellow/pink to orange or pink/colourless (1) [2]

(c) nitric acid (1) more volume added than sodium hydroxide (1) [2]

(d) repeat experiment (1) without indicator (1)
evaporate solution (1) [3]

[Total: 8]

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05. 0620_s14_ms_61 Q: 2

(a) precipitation / double decomposition (1) [1]
allow: ppt

(b) **(i)** low / insoluble / does not dissolve (1) [1]

(ii) high / soluble / dissolves (1) [1]

(c) filtration (1) [1]

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06. 0620_s14_ms_62 Q: 2

(a) pipette / burette (1) [1]
ignore: measuring cylinder

(b) Universal / pH indicator / pH paper / full range (1) [1]
ignore: indicator
not: other named indicator

(c) pH value rises / increases / becomes more alkaline (1)

steep change in middle (1) [2]
allow: suddenly / drastically / quoted figures

(d) **(i)** end / neutralisation / equivalence point / becomes neutral (1) [1]
allow: reaction finished / changes from acid to alkali / basic

(ii) 12.5 (1)

cm^3 (1) [2]

(iii) potassium hydroxide solution is 2 × (1)

more concentrated / stronger (1) ORA

half volume of potassium hydroxide used / twice volume of nitric acid used (1) [3]

(e) evaporation / steam (1)

solid / crystals formed (1) [2]
allow: decomposes or named products

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07. 0620_s15_ms_62 Q: 2

(a)	nitric acid / HNO_3;	1	
(b)(i)	spatula;	1	
(b)(ii)	(stirring / glass) rod;	1	**A** magnetic stirrer
(c)	filtration / decanting;	1	**A** description of decanting
(d)(i)	anhydrous chromium nitrate / $Cr(NO_3)_3$ / chromium oxide / Cr_2O_3 / hydrated chromium nitrate / $Cr(NO_3)_3.6H_2O$ / solid chromium nitrate;	1	**A** solid / powder / crystals
(d)(ii)	heat / evaporate / boil; to crystallising point owtte; award one mark for any two ideas: cool / filter / decant / wash / dry;	3	**A** description

08. 0620_s16_ms_62 Q: 4

	making the salt any 4 from: • known volume sulfuric acid; • add named indicator; • add potassium hydroxide solution to the acid until the indicator changes colour / is neutralised; • note / measure the volume of potassium hydroxide solution added; • repeat without indicator **OR** add (decolourising) charcoal; **obtaining crystals** any 2 from: • heat / evaporate solution to crystallising point until half evaporated **OR** until crystals (start to) form **OR** until saturated; • leave to cool; • filter to get crystals; • dry crystals (on filter paper) / leave to dry;	**6**

09. 0620_s16_ms_63 Q: 4

	method heat the salt; condenser shown on diagram; drops of water / condensation; colour change / blue solid becomes paler; **test pure water** boiling point; 100 °C;	**6**

10. 0620_s20_ms_63 Q: 1

Question	Answer	Marks
(a)	mortar	**1**
(b)	(to) speed up (the dissolving)	**1**
(c)(i)	funnel	**1**
(c)(ii)	residue	**1**
(d)	**p**lace in an evaporating basin and heat	**1**
	to the point of crystallisation	**1**
	cool **and** filter **and** dry crystals with filter / absorbent paper	**1**

11. 0620_w13_ms_63 Q: 1

(a) stirring / glass rod / stirrer (1)
Bunsen and / or burner (1) [2]

(b) solvents (1)
solution (1) [2]

(c) B (1)
allow: filter
C (1) [2]
allow: evaporating dish / basin

(d) evaporated / lost into air owtte / turned into steam / turned into water vapour (1) [1]

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12. 0620_w14_ms_61 Q: 1

(a) boxes completed to show stirrer / glass rod (1)
watchglass / evaporating dish (1) [2]

(b) to speed up the reaction (1) [1]

(c) correct answer 4.2 g (2)
if incorrect, evidence of 17.8 – 13.6 (1) [2]

(d) **(i)** solid / lead oxide visible / remaining (1) [1]
do not allow: mention of precipitate

(ii) filtration (1) [1]

(iii) excess (1) [1]
allow: residue

(e) Any **two** from:
evaporation / steam (1)
solid / crystals formed (1)
breakdown / decomposition of solid (1) [2]

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13. 0620_w14_ms_62 Q: 3

(a) spatula (1) [1]
do not allow: spoon

(b) (i) sulfuric (1) [1]

(ii) reacts quickly at room temperature (1) [1]
allow: heat not needed / reacts anyway

(c) (i) sulfuric acid / the acid (1) [1]

(ii) solution will be acidic / not neutral / impure salt (1) [1]

(d) (i) crystals appear / description of using glass rod (1) [1]
not: precipitate / evaporate to dryness

(ii) lose water / dehydrate (1) [1]
allow: reference to anhydrous
ignore: break down of crystals / powder forms

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14. 0620_w15_ms_63 Q: 1

(a)	spatula; evaporating dish / basin;	1 1	**A:** spoon **R:** watch glass / clock glass / crucible / petri dish
(b)(i)	crush / powder / grind / pound zinc carbonate; add to acid **and** stir / mix; (until) no more bubbles / excess carbonate / solid remains;	1 1 1	**I:** reaction is over
(b)(ii)	filter / filtration etc.;	1	**R:** 'filter funnel' / 'filter paper' only
(b)(iii)	2 from: • evaporate; • until crystallisation point / crystals (start to) form / saturated; • leave to cool;	1	**I:** heat or evaporating basin (in diagram) **R:** 'to dryness'

15. 0620_w17_ms_63 Q: 4

	heating to dryness method max [6]: **M1** weigh (any) sample of washing soda **M2** heat (to remove water of crystallisation) **M3** in named container **M4** cool **M5** reweigh **M6** repeat heating **M7** to constant mass **M8** appropriate calculation suggested for the percentage of water *mass of water method* max [6]: **M1** weigh (any) sample of washing soda **M2** heat to remove water of crystallisation **M3** in named container **M4** using apparatus capable of collecting water (vapour) **M5** cool / condense (water vapour) **M6** continue until no more collects **M7** weigh water **M8** appropriate calculation suggested for the percentage of water	**6**

16. 0620_w18_ms_61 Q: 1

(a)	**M1** (A),C,F		**1**
	M2 B,D,E **OR** B,E,D **OR** D,B,E		**1**
(b)	Evaporating / crystallising	basin / dish	**1**
(c)	To wash-out / dissolve / remove	sodium chloride / salt	**1**
(d)	Filtration		**1**
(e)	Melting point		**1**