Mark scheme

Making salts

Chemistry 0620 · Questions from Paper 4 and Paper 6

Total marks

67

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	Total
6	7	6	6	6	8	8	10	10	**67**

Question 1 **[6]**

1 **(a)** to speed up the reaction [1]

(b) solid visible owtte e.g. no more solid will dissolve [1]

(c) filtration / centrifuge **not** decant [1]

(d) to make sure water (of crystallisation) is not lost / stop dehydration /
so crystals do not turn into powder / does not decompose **not** crystals break [1]

(e) no heat needed / not necessary to warm acid (1)
carbonates react with acid at room temperature (1)
no bubbles would indicate that carbonate is in excess (1) [max 2]

[Total: 6]

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Question 2 [7]

2 **(a)** **(i)** measuring cylinder [1]

(ii) reaction will happen / is fast with cold acid [1]

(b) solid / powder visible / no more solid dissolves / fizzing stops when powder added [1]
not precipitate forms, **not** stops reacting

(c) diagram of funnel (1) and filter paper within (1) [2]

(d) heat to crystallising point owtte (1) to prevent loss of water of crystallisation (1) [2]
not heat and leave to cool

[Total: 7]

Question 3 [6]

3	**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

Question 4 [6]

4	**any 6 from** **MP1** adds cobalt(II) oxide to (dilute) sulfuric acid in a suitable container	6
	MP2 cobalt(II) oxide is in excess	
	MP3 the mixture is stirred / mixed	
	MP4 the acid / mixture is heated/warmed	
	MP5 filter (to remove (excess) cobalt(II) oxide)	
	MP6 heat filtrate / solution / leave to evaporate (reject heat to dryness)	
	MP7 filter out crystals / **description** of drying crystals	

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Question 5 [6]

5	any 6 points from: • add sodium chloride / lead nitrate to water • stir / mix / shake (to dissolve) • add / combine / mix the two reactants together • use of a suitable container • filter (to obtain lead(**II**) chloride as residue) • pour water over the residue (in the funnel) • description of how to dry the solid	**6**

Question 6 [8]

6(a)	spatula; evaporating dish / basin;	**1** **1**	**A:** spoon **R:** watch glass / clock glass / crucible / petri dish
6(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
6(b)(ii)	filter / filtration etc.;	**1**	**R:** 'filter funnel' / 'filter paper' only
6(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'

Question 7 [8]

7(a)	**A** glass / stirring rod	**1**
	B (conical) flask	**1**
7(b)	filtration	**1**
7(c)	filtrate	**1**
7(d)	step 4: wash / rinse (with water)	**1**
	to remove sodium sulfate / sodium chloride	**1**
	step 5: dry	**1**
	water	**1**

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Question 8 [10]

8(a)	method A; hydrochloric acid / HC*l* / hydrogen chloride solution; nickel carbonate + hydrochloric acid → nickel chloride + water + carbon dioxide;	3	hydrochloric acid / HC*l* can only score if written in the reagent space i.e. **R** hydrochloric acid / HC*l* in equation if reagent space is blank **I** hydrogen chloride (therefore 'hydrogen chloride + HC*l*' would get mark 2 BOD) **I** nickel carbonate **A** fully correct balanced chemical equation i.e. $NiCO_3 + 2HCl \rightarrow NiCl_2 + CO_2 + H_2O$ for the third mark **R** combination of words and formulae in the same equation for the third mark **I** concentration of acid for marks 2 and 3
8(b)	method C; any (aqueous / dilute / solution of soluble) bromide including potassium bromide / KBr, hydrogen bromide / HBr i.e. all bromides except silver, lead and mercury; $Pb^{2+} + 2Br^- \rightarrow PbBr_2$;	3	**A correct** formula of soluble bromide **I** lead nitrate **I** state symbols **A** multiples
8(c)	method B; sulfuric acid / hydrogen sulfate / H_2SO_4 ; $2LiOH + H_2SO_4 \rightarrow Li_2SO_4 + 2H_2O$ species; balancing;	4	**I** concentration of acid for mark 2 **I** indicators / lithium hydroxide **I** state symbols **A** multiples

Question 9 [10]

9 **(a)** nitric acid; [1]
sodium hydroxide / carbonate / hydrogen carbonate; [1]

copper(II) oxide / hydroxide / carbonate; [1]

any named soluble chloride; [1]
accept: *hydrochloric acid* / *hydrogen chloride*
silver(I) nitrate / ethanoate / sulfate; [1]
must be soluble silver salt **not** *silver oxide* / *carbonate*

zinc(II) sulfate [1]

(b) **(i)** $Ag^+(aq) + Cl^-(aq) \rightarrow AgCl(s)$ [2]
equation correct state symbols missing [1]

(ii) $ZnCO_3 + H_2SO_4 \rightarrow ZnSO_4 + CO_2 + H_2O$ [2]
correct formula for zinc sulfate = 1

[Total: 10]

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