Question number	Answer	Notes	Marks
1 (a) (i)	**Any two from:** **M1** calcium/solid/it disappears	ACCEPT dissolves / gets smaller IGNORE mass decreases	2
	M2 bubbles (of gas) / fizzing / effervescence	ACCEPT gas given off IGNORE hydrogen given off IGNORE incorrect gas / colour	
	M3 white solid (forms) / white suspension (forms) / (liquid) turns milky / (liquid) turns cloudy / white trails forms	ACCEPT white precipitate forms	
	M4 calcium moves (up and down)	IGNORE floats REJECT refs to moving on the surface	
	M5 water/solution/liquid gets warm	ACCEPT temperature of water/solution/ liquid rises IGNORE refs to heat released	
(ii)	**M1** any value greater than 7	ACCEPT "greater than 7"	2
	M2 hydroxide ions/OH^- are present / calcium hydroxide/$Ca(OH)_2$ is an alkali / calcium hydroxide/$Ca(OH)_2$ is a base	ACCEPT metal hydroxides are alkalis/bases IGNORE hydroxides are alkalis/bases	
	M2 dep on correct or missing **M1**	IGNORE calcium is an alkali metal	
(b)	**M1** (Solid X) – CaO / calcium oxide	if both formula and name given both must be correct	3
	M2 (Solution Y) – $CaCl_2$ / calcium chloride		
	M3 (Solid Z) – $CaCO_3$ / calcium carbonate	REJECT $Ca(HCO_3)_2$ / calcium hydrogencarbonate	

Question number	Expected Answer	Accept	Reject	Marks
2 (a) (i)	M1 calcium M2 magnesium	Ca Mg	any other answers	1 1
(ii)	iron / zinc	Fe / Zn	any other answers	1
(iii)	calcium magnesium zinc iron copper M1 for calcium as most reactive M2 for copper as least reactive M3 for remainder in correct order	Ca Mg Zn Fe Cu		3
(b) (i)	hydrogen / H_2		H	1
(ii)	all the (sulfuric) acid has reacted / all hydrogen (ions) have been replaced (by magnesium (ions)) OR acid has been used up/been neutralised / acid has run out IGNORE the acid is saturated / excess magnesium has been added	sulphuric for sulfuric hydrogen ions / H^+ for acid	all the magnesium / reactants used up	1
(iii)	magnesium sulfate (solution) IGNORE incorrect formula	sulphate for sulfate $MgSO_4$		1
(iv)	filtration / filter (it / magnesium / solution) / decantation / decant (off the water / solution) IGNORE references to distillation / centrifuging / washing / evaporation after filtration	description of filtration	sieve crystallisation	1

2 (c)	(i)	exothermic			1
	(ii)	magnesium oxide IGNORE incorrect formula	MgO		1

Question number	Answer	Notes	Marks
3 (a) (i)	silver chloride	Accept silver(I) chloride	1
(ii)	$AgNO_3$ + NaCl → AgCl + $NaNO_3$	Reactants = 1 Products = 1 Award 1 mark if all formulae correct but equation unbalanced Accept a correct ionic equation for 2 marks - Ag^+ + Cl^- → AgCl Ag^+ + Cl^- → scores M1 (but only with arrow)	1 1
(b)	s for $PbSO_4$ and aq for other three species		1
(c) (i)	(dilute) nitric acid / HNO_3 sodium hydroxide / NaOH	Accept sodium carbonate / sodium hydrogencarbonate / sodium bicarbonate Award 1 mark if both substances correctly identified but written in the wrong order If name and formula given, both must be correct.	1 1
(ii)	22.30 3.60 18.70	Penalise missing zeroes once only Award 1 for 2 correct readings in wrong order M3 CQ on M1 and M2	1 1 1
(d) (i)	ticks in boxes under columns 2 and 4		1
(ii)	$\frac{22.5(0) + 22.6(0)}{2}$ 22.55 (cm^3)	CQ on candidate's ticked results – if average of different results, then 0 If ticked results other than the correct ones, then final answer must be to 2 dp to score M2, but no penalty for missing trailing zeroes Average of 1 result scores 0 Correct answer with no working scores 2 marks	1

3 (e)	filter leave crystals to dry / dab crystals with filter paper/kitchen towel / warm (in oven)	Allow decant / pour off water Ignore washing Allow "leave to evaporate (rest of) water / leave to evaporate to dryness" for 2 marks If filter / decant / pour off water mark not scored, then marks can be awarded as follows: M1 leave in warm place/sun/on window ledge / heat or warm (in oven) M2 to evaporate/remove water/until dry No marks can be awarded if there is a statement about using strong heating or a bunsen burner	1 1

(f)	$NaNO_2$ M_r = 69 n ($NaNO_3$ / $NaNO_2$) = 0.02 OR $\frac{1.70 \times 69}{85}$ / $\frac{1.70 \times 138}{170}$ 1.38 (g)	Award mark if 138 seen ecf for incorrect M_r Accept 2sf or better Correct answer with no working scores 3 marks	1 1 1

Total 17 marks