Question number	Answer	Notes	Marks
1 (a)	measuring cylinder/measuring jug	accept burette/pipette	1
(b)	no more bubbles/fizzing/effervescence/gas given off **OR** solid/zinc carbonate can be seen in the beaker **OR** the solid/zinc carbonate stops disappearing/dissolving **OR** a suspension (of zinc carbonate) forms **OR** the liquid turns cloudy	allow solid remains in the solution ignore the reaction stops	1
(c)	filtration	accept filtering accept centrifuging	1
(d)	**M1** – heat/boil to partially evaporate (the water) **M2** – leave to crystallise / leave until crystals form **M3** – filter (to remove excess liquid) **M4** – appropriate method of drying crystals	accept to remove some of the water accept heat to form a saturated/concentrated solution / heat until crystals form on (cold) glass rod / heat until crystals (just start to) form If evaporated to dryness then award no marks for whole question accept leave to cool accept pour off/decant (excess) liquid e.g. use filter paper/blotting paper/kitchen towel / leave in (warm) oven/drying oven Accept leave to dry Do not accept hot oven/heat with a Bunsen flame	1 1 1 1

Question number	Answer	Accept	Reject	Marks
2 (a)	to increase the rate/speed (of the reaction) IGNORE to start the reaction/to provide energy/references to the copper(II) oxide will not react without heat / to make it dissolve faster / to give particles more energy	to overcome the activation energy/to provide <u>activation</u> energy (for the reaction)	Answers referring to copper instead of copper(II) oxide	1
(b)	it stops disappearing OR there is a (black) suspension/solid /copper(II) oxide OR the mixture/it turns cloudy/black IGNORE crystals	stops dissolving precipitate/ppt	 any colour other than black	1
(c)	to remove (unreacted/excess) copper(II) oxide IGNORE references to impurities/crystals	to remove (unreacted/excess) solid to obtain a solution (of copper(II) sulfate)	to separate copper(II) oxide from sulfuric acid	1
(d)	copper(II) sulfate/the crystals are less soluble in cold water (than in hot water) OR solubility decreases with temperature IGNORE reference to water evaporating	reverse argument <u>ions</u> join together (to form a lattice) <u>ionic</u> lattice forms	references to freezing	1

(e)	blue IGNORE shades of colour		any colour other than blue	1
(f)	on filter paper/kitchen towel/tissue paper OR leave / in a warm place / in the sun / on a radiator / near a window / in a (warm/drying) oven	OWTTE desiccator	heat / hot oven	1

(Total marks for Question 2 = 6 marks)

Question number	Answer	Accept	Reject	Marks
3 (a) (i)	B	lower case letters		1
(ii)	D			1
(iii)	A			1
(iv)	C			1
(b)	**M1 -** (a substance) containing (two or more) element<u>s</u> IGNORE atoms for **M1** only **M2** – bonded (together) /<u>chemically</u> combined (in a fixed ratio)	 <u>chemically</u> joined	mixture for M1 only molecules/particles bonded, etc for M1 and M2	1 1 1
(c) (i)	**M1** - Na loses electron(s) **M2** – Cl gains electron(s) **M3** – Na becomes 2.8 AND chlorine becomes 2.8.8 If incorrect number of electrons transferred, max 2 IGNORE references to full shells max 1 for mention of covalent bonding All 3 marks can be scored from correct dot and cross diagram<u>s</u> showing electron transfer			1 1 1

(ii)	**M1** – Na = 23 <u>AND</u> Cl = 35.5 **M2 –** 58.5 **M2** dep on **M1** **IGNORE units** **Correct answer with no working scores 2**			1 1

(Total marks for Question 3 = 11 marks)

Question number			Answer	Notes	Marks
4	a	i	B (filtration)		1
		ii	C (fractional distillation)		1
	b	i	B (filtration)		1
		ii	D (simple distillation)		1
		iii	A (crystallisation)		1

Question number			Answer	Notes	Marks
4	c	i	place paper in beaker/container/solvent/water solvent level <u>below</u> spots/starting line leave until solvent/water/liquid AND rises/reaches (near) top (of paper) / solvent (front) reaches level shown OR leave until dyes/spots separate (allow to) dry / cover/seal container	Any three for 1 each	3
		ii	insoluble/did not dissolve (in water/solvent)		1
		iii	2		1
		iv	1		1
		v	46 70	Accept value in range 44.5 - 48.5 Accept value in range 69 - 70 Award 1 for M1 and M2 both correct but recorded in cm	1 1
			0.67	Accept value in range 0.63 - 0.7(0) ECF from values recorded (even if >1)	1

(Total for Question 4 = 14 marks)

Question number	Expected Answer	Accept	Reject	Marks
5 (a)	M1 precipitate of barium sulfate	sulphate for sulfate insoluble barium sulphate / $BaSO_4$	incorrect name of ppt.	1
	M2 no precipitate	no (visible) change solution (formed)		1
	M3 precipitate of calcium sulfate IGNORE colours penalise incorrect extra observations (e.g. effervescence) ONCE only For M1 and M3 only: if only precipitate appears twice (with no names), penalise <u>missing</u> names once only if only names correct (with no precipitates), penalise omission of precipitate once only	sulphate for sulfate insoluble calcium sulfate / $CaSO_4$	incorrect name of ppt.	1

Question number	Expected Answer	Accept	Reject	Marks
5 (b)	aq aq s aq			1
(c) (i)	obtain the lead(II) bromide/the residue/the solid OR remove the liquid/solution/potassium nitrate/water	separate the solid and liquid		1
(ii)	to wash away/remove the (remaining) potassium nitrate / lead(II) nitrate / potassium bromide / solution IGNORE clean	wash away / remove (remaining soluble) impurities to make it pure	make the mixture pure	1
(iii)	distilled water is pure / does not contain (dissolved) impurities / ions / substances / compounds / other chemicals (that would contaminate the lead(II) bromide) / residue / solid) IGNORE elements IGNORE references to distilled water being cleaner (ORA)	reverse argument for tap water	any suggestion that the water / impurities react	1
(iv)	to evaporate the water / to dry (the solid/crystals) / increase rate of evaporation (of water) IGNORE liquid	to avoid decomposition (if heated strongly)	to evaporate the potassium nitrate / solution any reference to crystallisation	1

Question number	Answer	Notes	Marks
6 (a) (i)	element(s)		1
(ii)	compound		1
(iii)	mixture		1
(iv)	element		1
(b) (i)	solid		1
(ii)	gas		1

Total 6 marks