Question number	Answer	Notes	Marks
1 (a)	potassium / sodium / magnesium / zinc	accept K / Na / Mg / Zn if both name and symbol given, mark name only	1
(b)	**M1** bubbles of gas produced rapidly/quickly **M2** solid disappears quickly	accept any indication that the rate of evolution of bubbles and the disappearance of the solid is in between that of magnesium and zinc	2
(c) (i)	potassium hydroxide	accept KOH if both name and formula given, mark name only	1
(ii)	MgO		1
(d) (i)	carbon/C <u>and</u> it displaces/replaces zinc/Zn	reject 'displaces zinc oxide / displaces oxygen' accept 'it gains oxygen (from the zinc oxide) / it reduces zinc (oxide)'	1
(ii)	**M1** carbon / C **M2** it removes oxygen from the zinc (oxide) / causes zinc <u>ions</u> to gain electrons / gains oxygen / is oxidised	**M2** dep on **M1** reject 'displaces oxygen'	2

Question number	Answer	Notes	Marks
2 a	mix / add / react (the two) solutions / salts together	Ignore references to volumes	
	stir	Accept swirl	4
	filter	Accept description of filtration	
	wash (with water)		
	suitable method of drying	eg warm / heat / place in oven / leave on window ledge / leave to dry / dry with filter paper or kitchen towel Not just dry Any four above for 1 mark each If M3 not scored then M4 and M5 cannot be awarded If description of evaporation of solution, then M4 and M5 cannot be awarded	
	identifying two suitable pieces of apparatus	Any two of • beaker / flask / test tube (for mixing) • (glass) rod (for stirring) • (filter) funnel/paper (for separation) Reference to filter paper or filter funnel scores M3 and counts as one of M6 If any other substance added, then MAX 4	1

Question number	Answer	Notes	Marks
2 b i	B (the products are both elements)		1
ii	electrons on wrong side / should be on right /should be $- 2e^-$	Accept + in front of electrons (should be —)	1
	2Br should be Br_2	Accept product is shown as a bromine atom / should be shown as a bromine molecule Equation correctly rewritten scores both marks	1
iii	ions stop moving / ions not free to move OR electrons stop moving (through wires)	Ignore liquid becomes solid / no free ions Accept electric current in place of electrons Reject implication that electrons stop flowing through liquid	1
			Total 9 marks

Question number				Answer	Notes	Marks
3	a		M1	(same) volume of solution/liquid	Accept amount in place of volume	3
			M2	(same) concentration (of solution/liquid)		
			M3	(same) amount of metal	Accept solid in place of metal Accept moles/mass in place of amount Reject salt in place of metal	
			M4	(same) (total) surface area / state of subdivision of solid	Accept all powder / all particles same size / size of metal	
			M5	(same) method/length of time/speed of stirring		
					Ignore references to polystyrene cup / starting temperature	
					Any three for 1 each	
	b		M1	22.4	Ignore trailing zeroes and award 1 mark for both correct values in wrong order	1
			M2	17.7		1
			M3	4.7	Consequential on values used in M1 and M2 Reject –4.7	1

Question number				Answer	Notes	Marks
3	c	i	M1	magnesium / Mg		1
			M2	largest difference in (recorded) temperatures	DEP on M1 Do not accept results in place of temperatures Explanation must be comparative: Not just rises are 10.5 and 15.5 without reference to values for other metals Not just very different temperature changes Accept two temperatures furthest apart Not just largest temperature rise No penalty for quoting wrong difference, eg 4 C	1

Question number				Answer	Notes	Marks
3	c	ii	M1	magnesium / Mg		1
			M2	largest temperature rise/change	DEP on M1 Do not accept results in place of temperatures Accept answers stating most heat produced / most exothermic	1
		iii		silver/it is less reactive (than copper) / lower in the reactivity series OR no reaction	Must be implied comparison Accept copper more reactive than silver but not just silver is unreactive	1
					Reject references to differences in reactivities of silver and copper ions / silver and copper sulfate	
		iv		silver and X both have no temperature rise/change OR two metals show no temperature rise/change	Accept two metals did not react Accept two showed zero (temperature rises)	1
	d			$Zn + CuSO_4 \rightarrow Cu + ZnSO_4$	Ignore state symbols Accept correct ionic equation with or without spectator ions	1
					Total	**13**

Question number				Answer	Notes	Marks
4	a		M1	exothermic	Accept phonetic spellings Do not accept endothermic or any spelling that could be taken as endothermic or a hybrid such as exdothermic	1
	b	i	M1 M2 M3 M4 M5 M6	volume of solution concentration (of solution) amount / mass of metal same surface area of metal same (rate/time of) stirring same <u>starting/initial</u> temperature	Allow amount of solution Allow quantity of metal Allow same size pieces / same state of subdivision Ignore references to room temperature Any two for 1 each	1 1 1 1 1 1
		ii	M1 M2 M3	18.7(0) 26.8(0) 8.1(0)	 Conseq on M1 and M2	1 1 1
		iii	M1 M2	Zn / zinc X	Accept phonetic spellings	1 1

Question number				Answer	Notes	Marks
4	c		M1	$Zn + XSO_4 \rightarrow ZnSO_4 + X$	Ignore state symbols	1
	d		M1	would react with water OR forms insoluble calcium sulfate/product	Allow too reactive/very reactive/too high in the reactivity series Do not allow more reactive than other metals (in experiment)	1

Total 10 marks