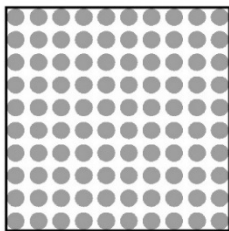
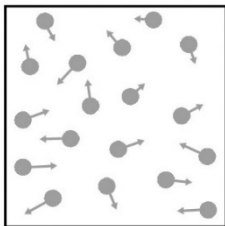
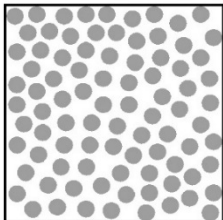


Question	Part	Step	Answer	Mark scheme
1	ai	2nd	B Bunsen burner	1 mark
	aii	2nd	A clamp and stand	1 mark
	bi	4th	the more salt you add, the higher the boiling point gets	1 mark
	bii	5th	103 °C	1 mark
	c	5th 5th	mixture – two substances that can be separated element – contains only one type of atom compound – two or more elements chemically bonded together atom – the simplest particle of matter	2 marks – 1 mark for 1 or 2 correct, 2 marks for all 4 correct
2	a	3rd	same volume of water <i>or</i> same quantity of chemical substance <i>or</i> all substance dissolved/reacted when temperature taken	1 mark
	b	4th	$26 - 19 = 7$ (°C)	1 mark
	c	4th 4th	substance 1 this reaction had the highest temperature rise	2 marks
3	ai aii	5th 5th 5th 5th	 <p>– solid – Particles vibrate but cannot move past each other.</p>  <p>– gas – Particles are far apart and free to move.</p>  <p>– liquid – Particles are in contact but can move past each other.</p>	4 marks 2 for all diagrams and states correct, 1 for 1 correct 2 for all states and descriptions correct, 1 for 1 correct
	bi	3rd 3rd	keep the same shape/do not flow keep the same volume/hard to compress	2 marks

Question	Part	Step	Answer	Mark scheme
	bii	2nd	B melting	1 mark
	c	5th 5th	use the substance to close a gap in an electrical circuit if a current flows/bulb comes on, the substance is an electrical conductor/metal or heat one end of a rod made of the substance if the other end gets hot the material is a thermal conductor/metal	2 marks
4	a	4th 4th	red acidic	2 marks – 1 for each point
	b	4th	Any one from: <ul style="list-style-type: none"> • wear goggles • wipe up any spillages immediately • handle with care • wash hands after handling • wear gloves 	1 mark – Accept equivalent answers
	c	6th	vinegar is acidic so it neutralises the venom	1 mark
5	ai	6th	D	1 mark
	aii	6th 6th	aluminium sodium	2 marks – 1 for each point
	bi	6th	iron + oxygen → iron oxide	1 mark
	bii	6th	A 0.3 g	1 mark
6	a	3rd	breaking down	1 mark
	bi	4th	A 80 seconds	1 mark
	bii	4th 4th	copper carbonate it took the least time	2 marks – 1 for each point
7	ai	7th	C exothermic	1 mark
	aii	10th 10th	Breaking bonds requires energy, and making bonds releases energy. More energy is released from making bonds than required for breaking bonds in an exothermic reaction.	2 marks – 1 for each point
	bi	7th 7th	zinc + hydrochloric acid → zinc chloride + hydrogen	2 marks – 1 for reactant, 1 for product
	bii	6th 6th	$120 + 3 - 121.5 = 1.5 \text{ g}$	1 mark for substitution 1 mark for final answer Award 2 marks for a correct answer (number and unit) with no working shown
8	a	5th 5th 6th	at least three points plotted correctly all points plotted correctly line through data (accept both a line connecting the points or a line of best fit)	3 marks – 1 for each point

Question	Part	Step	Answer	Mark scheme
	b	6th	all the copper sulfate had reacted	1 mark
9	a	6th 6th 6th	Any three points from the following: <ul style="list-style-type: none"> • formed from sediments/bits of weathered rock • sediments deposited • sediments are compacted (accept 'squashed') by more sediments accumulating above them • water is squeezed out • minerals dissolved in the water cement (accept 'glue') the grains together 	3 marks – 1 for each point, though must be in correct order Maximum of 2 marks if statements not in correct order
	bi	6th	The rocks had not absorbed as much water as they could in the first 10 minutes.	1 mark – Accept equivalent answers
	bii	5th 5th	put the rocks back in water (for another 10 minutes) keep repeating this until the mass does not change any more	2 marks – 1 for each point
	ci	6th 6th	place the rock in the water and record the volume subtract 50 cm ³	2 marks – 1 for each point Accept equivalent answers
	cii	7th 7th	$8.1 \div 3.0 = 2.7 \text{ g/cm}^3$	1 mark for substitution 1 mark for final answer Award 2 marks for a correct answer (number and unit) with no working shown
	d	6th	fewer air spaces/less able to absorb water	1 mark
10		See below	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. <ul style="list-style-type: none"> • add water to the rock salt • salt is soluble and will dissolve • sand is insoluble • filter the suspension • the filtrate contains the salt • the residue is the insoluble sand • heat the salt solution in an evaporating dish • the water (solvent) will evaporate • pure salt will remain in the evaporating dish. 	See marks below

Marks	Step	Descriptor
1–2	3rd–4th	<u>Level 1</u>

Marks	Step	Descriptor
		The explanation contains basic information with a limited attempt made to link knowledge and understanding to the given context. Flawed or simplistic connections are made between elements in the context of the question.
3–4	5th	<u>Level 2</u> The explanation is occasionally supported through linkage and application of knowledge and understanding of scientific ideas to the given context. The explanation shows some linkages and lines of scientific reasoning with some structure.
5–6	7th–8th	<u>Level 3</u> The explanation is supported throughout by sustained linkage and application of knowledge and understanding of scientific ideas to the given context. The explanation shows a well-developed, sustained line of scientific reasoning which is clear and logically structured.

Final Step Calculation

Marks	Step
1–4	Below 2nd
5–9	2nd
10–17	3rd
18–27	4th
28–37	5th
38–46	6th
47–52	7th
53–56	8th
57–58	9th
59–60	10th

Question	Part	Step	Answer	Mark scheme
1	ai	5th	A	1 mark
	aii	4th	filtration	1 mark
	b	4th 4th	suspension – formed when an insoluble substance is added to a liquid solvent – a liquid that can dissolve another substance solute – the solid that is dissolved in a liquid solution – formed when a substance dissolves in liquid	2 marks 1 mark for 1 or 2 correct, 2 marks for all 4 correct
2	ai	6th	D	1 mark
	aii	6th 6th	aluminium sodium	2 marks – 1 for each point
	bi	6th	iron + oxygen → iron oxide	1 mark
	bii	6th	A 0.3 g	1 mark
3	ai	5th	B magnesium chloride	1 mark
	aii	5th 5th	lighted splint gives... ...squeaky pop	2 marks – 1 for each point
	bi	7th 7th	zinc + hydrochloric acid → zinc chloride + hydrogen	2 marks – 1 for reactant, 1 for product
	bii	6th 6th	120 + 3 – 121.5 = 1.5 g	1 mark for substitution 1 mark for final answer Award 2 marks for a correct answer (number and unit) with no working shown
	c	8th 8th	zinc is more reactive/a reaction will occur zinc sulfate and copper will form	2 marks – 1 for each point
4	a	5th 5th 6th	at least three points plotted correctly all points plotted correctly line through data (accept both a line connecting the points or a line of best fit)	3 marks – 1 for each point
	b	6th	all the copper sulfate has reacted	1 mark
	c	10th 10th	the fuse supplies the activation energy... ...to break bonds and start the reaction	2 marks – 1 for each point

Question	Part	Step	Answer	Mark scheme
5	a	6th 6th 6th	Any three points from the following: <ul style="list-style-type: none"> formed from sediments/bits of weathered rock sediments deposited sediments are compacted (accept 'squashed') by more sediments accumulating above them water is squeezed out minerals dissolved in the water cement (accept 'glue') the grains together 	3 marks – 1 for each point though must be in correct order Maximum of 2 marks if statements not in correct order.
	bi	6th	the rocks had not absorbed as much water as they could in the first 10 minutes	1 mark – Accept equivalent answers
	bii	5th 5th	put the rocks back in water for (another 10 minutes) keep repeating this until the mass does not change any more	2 marks – 1 for each point
	ci	6th 6th	place the rock in the water and record the volume subtract 50 cm ³	2 marks – 1 for each point Accept equivalent answers
	cii	7th 7th	$8.1 \div 3.0 = 2.7 \text{ g/cm}^3$	1 mark for substitution 1 mark for final answer Award 2 marks for a correct answer (number and unit) with no working shown
	d	6th	fewer air spaces/less able to absorb water	1 mark
6	ai	4th	C	1 mark
	a ii	4th	litmus paper/solution	1 mark – Accept equivalent answers
	bi	5th	C	1 mark
	bii	6th	solution B, because it will neutralise the soil/is an alkaline solution	1 mark
7	ai	5th	a metal with one or more other elements added	1 mark
	a ii	7th 7th	a compound has a fixed composition/ratio between the different elements in an alloy, the different substances can be mixed in any proportions	2 marks – 1 for each point
	b	6th	the alloy has different/better properties than the pure metal	1 mark

Question	Part	Step	Answer	Mark scheme
	c	8th 8th	Any two points from the following: <ul style="list-style-type: none"> the different elements in the alloy have different atom/particle sizes layers in a pure metal slide over each other fairly easily adding other elements makes it harder for the layers to slide... ...so the alloy becomes harder/stronger 	2 marks – 1 for each point
8	a	7th 7th	he put them in order of (atomic) mass however, he reordered a few elements to make sure elements in the same column had similar properties <i>or</i> he left gaps where he thought an element had not yet been discovered	2 marks – 1 for each point
	b	7th	His understanding was that elements in the same group/vertical column have similar properties and/or the properties of elements change gradually going up/down a group.	1 mark
9	ai	4th	same concentration of acid same temperature	1 mark – Both variables need to be correct for the mark
	aii	5th	repeat the experiment several times, to see if the results are repeated (the rocks are still in same order of amount of gas given off)	1 mark – Accept equivalent answers
	aiii	5th	the gas given off when sample C reacts is much less than for the other three samples	1 mark
	b	9th 9th 9th	$\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$	3 marks – 1 for reactants, 1 for products, 1 for being balanced
10		See below	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. <ul style="list-style-type: none"> burner heats the air in the balloon particles gain energy particles have more kinetic energy speed of the gas particles increases density of air inside the balloon decreases balloon rises. 	See marks below

Marks	Step	Descriptor
1–2	4th–6th	<u>Level 1</u> The explanation contains basic information with a limited attempt made to link knowledge and understanding to the given context. Flawed or simplistic connections are made between elements in the context of the question.
3–4	7th	<u>Level 2</u> The explanation is occasionally supported through linkage and application of knowledge and understanding of scientific ideas to the given context. The explanation shows some linkages and lines of scientific reasoning with some structure.
5–6	8th	<u>Level 3</u> The explanation is supported throughout by sustained linkage and application of knowledge and understanding of scientific ideas to the given context. The explanation shows a well-developed, sustained line of scientific reasoning which is clear and logically structured.

Final Step Calculation

Marks	Step
1–9	Below 4th
10–17	4th
18–27	5th
28–37	6th
38–45	7th
46–52	8th
53–56	9th
57–60	10th