

- 1 (a) **A** [1]
- (b) **D and F** note: both needed for mark [1]
- (c) **E** [1]
- (d) **B** [1]
- (e) **C** [1]

Question	Answer	Marks
2(a)(i)	M1 movement of electron(s) from potassium to iodine; M2 one electron transferred;	2 1 1
2(a)(ii)	M1 regular arrangement / (giant) lattice of alternating; M2 positive potassium ions / K^+ and negative iodide ions / I^- ;	2 1 1
2(a)(iii)	M1 strong (forces of) attraction (between oppositely charged ions) / ionic bonds are strong; M2 which require lots of energy to overcome / break;	2 1 1
2(b)(i)	M1 dissolve solids (in water) and mix / combine / add; M2 filter; M3 wash the residue (with water); M4 leave to dry / place in oven / dry between filter papers;	4 1 1 1 1
2(b)(ii)	$Pb^{2+} + 2I^- \rightarrow PbI_2$ formulae of ions correct; rest correct;	2
2(c)(i)	start colour: colourless; end colour: brown;	2 1 1
2(c)(ii)	M1 iodide / I^- ; M2 it is oxidised OR it loses electrons / it increases oxidation number / it reduces the chlorine;	2 1 1

Question	Answer		Marks
3(a)	CO ₂ ;		4
		solid;	
		poor conductor / non-conductor;	
	simple molecular / simple (covalent);		
3(b)(i)	cov		1

Question	Answer	Marks
3(b)(ii)	all bonds are (very) strong or bonds; or bonds need a lot of energy or heat to break; or (there are) no weak bonds/no (weak) intermolecular forces;	1
3(b)(iii)	weak forces between molecules; or weak intermolecular forces or weak van der Waals' forces; or low amount of energy needed to break intermolecular / van der Waals' forces;	1
3(b)(iv)	no (moving) ions / no mobile or moving electrons / all electrons used in bonding / made of uncharged molecules;	1
3(c)	$2\text{NaOH} + \text{CO}_2 \rightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O}$ or $\text{NaOH} + \text{CO}_2 \rightarrow \text{NaHCO}_3$ formula of Na_2CO_3 / NaHCO_3 ; whole equation correct;	2
3(d)(i)	(com combustion / burning;	1
3(d)(ii)	photosyn	1
3(d)(iii)	resp	1

Question	Answer	Marks
4(a)	2^2 ; or S ;	1
4(b)	test conductivity; gold conducts/ora; or malleability / hit with a hammer; gold malleable / only gold produces ringing sound / ora; or density; gold denser / ora; or add acid / any named / formula of acid; gold does not react (ignore products with pyrites) / ora; or heat (both strongly) in air / oxygen; iron pyrite reacts (ignore products); or melting point; gold lower / ora; or heat with a more reactive metal than iron; gold does not react / ora;	2
4(c)(i)	$2 + 11O_2 \rightarrow 2Fe_2O_3 + 8SO_2$ all formulae; balancing;	2
Question	Answer	Marks
4(c)(ii)	bleaching (in the manufacture of) wood pulp (for paper or straw or wool or cotton) / (food) preservative or killing bacteria in food or wine / fumigant / refrigerant / tanning(leather);	1

Question	Answer	Marks
5(a)(i)	any three from: <ul style="list-style-type: none"> • each oxygen is joined to two silicons / atoms; • each silicon is joined to four oxygens / atoms; • tetrahedral (around silicon) / similar to diamond; • linear around oxygen; 	3
5(a)(ii)	any three from: <ul style="list-style-type: none"> • high melting point / boiling point; • hard; • strong; • (colourless) crystalline (solid); • brittle / not malleable; • poor / non-conductor (of electricity) / insulator; • insoluble (in water); 	3
6(a)(iii)	(a) SiO_2 reacts with or dissolves in or neutralises an acid or acidic oxide;	1
	SiO_2 does not react or dissolve in or neutralise an alkali or base or basic oxide;	1
5(b)	carbon dioxide has a simple molecular structure;	1

Question	Answer	Marks
6(a)(i)	$3;$	1
(a)(ii)	$2S_3;$	1
(b)(i)	$2;$	1
(b)(ii)	$3+;$	1
(c)(i)	$2(SO_4)_3;$	1
(c)(ii)	$2;$	1

Question	Answer	Marks
7(a)(i)	vibrate (about fixed position)/vibration;	1
(a)(ii)	electrostatic force of) attraction; (between) positive ions and negative ions/oppositely charged ions/unlike charged ions/cations and anions;	1 1
(a)(iii)	regular/repeated/pattern/framework/ordered/alternating/organised (arrangement of); positive and negative ions/oppositely charged ions/cations and anions/unlike charged ions;	1 1
(b)(i)	correct direction (going towards negative electrode);	1
(b)(ii)	$\text{Li}^+ + e \rightarrow \text{Li}/\text{Li}^+ \rightarrow \text{Li} - e$;	1
(b)(iii)	$2\text{Br} \rightarrow \text{Br}_2 + 2e$ / $2\text{Br} - 2e \rightarrow \text{Br}_2$ formulae; balancing;	2
(b)(iv)	Br /bromide (ion); electron lost/donated electrons/increased oxidation state/increased oxidation number/oxidation numbers changed from -1 to 0/increased valency;	1 1

Question	Answer	Marks
7(c)	M1 (gas) hydrogen (given off at cathode)/H ₂ ; M2 hydroxide ions/lithium hydroxide/OH /LiOH are alkali(ne); M3 $2\text{LiBr} + 2\text{H}_2\text{O} \rightarrow 2\text{LiOH} + \text{H}_2 + \text{Br}_2$; or $2\text{H}^+ + 2e \rightarrow \text{H}_2/2\text{H}^+ \rightarrow \text{H}_2 - 2e$; or $2\text{Br} \rightarrow \text{Br}_2 + 2e$ / $2\text{Br} - 2e \rightarrow \text{Br}_2$; or $2\text{H}^+ + 2\text{Br} \rightarrow \text{H}_2 + \text{Br}_2$;	3