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)	$2NaOH + CO_2 \rightarrow Na_2CO_3 + H_2O$ **or** $NaOH + CO_2 \rightarrow NaHCO_3$ 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: • 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: • 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)	$_2$ reacts with or dissolves in or neutralises an acid or acidic oxide; SiO_2 does not react or dissolve in or neutralise an alkali or base or basic oxide;	**1** **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)	$Li^+ + e \rightarrow Li$ / $Li^+ \rightarrow Li - e$;	1
(b)(iii)	$2Br \rightarrow Br_2 + 2e$ / $2Br - 2e \rightarrow Br_2$ 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** $2LiBr + 2H_2O \rightarrow 2LiOH + H_2 + Br_2$; **or** $2H^+ + 2e \rightarrow H_2$ / $2H^+ \rightarrow H_2 - 2e$; **or** $2Br \rightarrow Br_2 + 2e$ / $2Br - 2e \rightarrow Br_2$; **or** $2H^+ + 2Br \rightarrow H_2 + Br_2$;	3