Question number	Answer	Notes	Marks
1 (a) (i)	**M1** – (covalent) bonds have to be broken	any mention of ions / metallic bonding / molecules / intermolecular forces scores 0/2	1
	M2 – large amount of energy required / bonds are strong	Accept large number of bonds to be broken Accept forces (of attraction) between <u>atoms</u> in place of bonds	1
(ii)	the (covalent) bonding in silicon dioxide is stronger (than the (ionic) bonding in sodium chloride)	Accept the covalent bonds (in silicon dioxide) are stronger than the ionic bonds (in sodium chloride) Accept more energy is required to break the (covalent) bonds in silicon dioxide (than is required to break the (ionic) bonds in sodium chloride) Accept forces (of attraction) between <u>atoms</u> in place of bonds	1
(b)	<u>ions</u> flow/move (to the electrodes)	Accept ions are mobile/can move reject electrons	1
(c)	weak forces (of attraction) between <u>molecules</u> / weak <u>intermolecular</u> forces (of attraction) / little energy is required to separate <u>molecules</u>	Accept boiling point is below room temperature reject any mention of covalent bonds broken	1

Question number				Answer	Notes	Marks
2	a	i	M1	H—O—H with both bonds represented by 2 shared electrons	Accept 2 dots, 2 crosses or 1 of each Atoms do not have to be labelled with H or O If wrongly labelled, only M1 can be awarded	1
			M2	8 electrons in outer shell of O AND 2 electrons in outer shell of both H	Ignore inner shell of O Reject if H has 2 shells M2 dependent on M1	1
		ii	M1	(strong electrostatic) attraction between bonding/shared pair of electrons	Must refer to pair or two electrons	1
			M2	and nuclei (of hydrogen and oxygen)	Accept word nucleus instead of nuclei if clear reference to 2 atoms 0/2 if any mention of ions / electron transfer M2 dependent on mention of both attraction and electrons in M1	1

Question number				Answer	Notes	Marks
2	b	i	M1	idea of electron transfer / loss and gain of electrons		1
			M2	direction of transfer, eg sodium to oxygen / sodium loses and oxygen gains		1
			M3	correct number of electrons involved, eg (each) sodium loses 1 and oxygen gains 2	Ignore charges on ions Ignore covalent 0/3 if any mention of electron sharing All marks may be scored on diagrams or by reference to electronic configurations Max 2 if molecules mentioned	1
		ii	M1	(sodium) loses electron(s)	Ignore oxygen gains electrons	1

Question number				Answer	Notes	Marks
2.	c		M1 M2	attractions between water molecules are weak(er) / easily overcome / need little energy to break attractions between (sodium and oxide) ions are strong(er) / ionic bonds are strong /need a lot of energy to break	Allow (named) intermolecular forces in place of attractions Do not award M2 if any mention of intermolecular forces / metallic bonding Any implication of <u>breaking</u> covalent bonds = 0/2	1 1

Question number				Answer	Notes	Marks
2	d	i	M1 M2 M3	s l aq	All three correct = 2 marks Two correct = 1 mark One/none correct = 0 marks Do not award M1 for g or if not possible to be sure that it is s and not g Do not award marks for abbreviations such as sol / liq	2
		ii	M1 M2	blue / purple OH^- / hydroxide	Allow indigo or violet M1 and M2 independent	1 1

Total 14 marks