Ionic/Covalent/Metallic Bonding

Q1. (2018) – 4d

4(d)	**A** -6 low **1. The only correct answer is A** ***B*** *is not correct because bpt is too high and solubility not high* ***C*** *is not correct because solubility not high* ***D*** *is not correct because bot is too high*		**(1)** AO 3 2b

Q2. (2018) – 4e

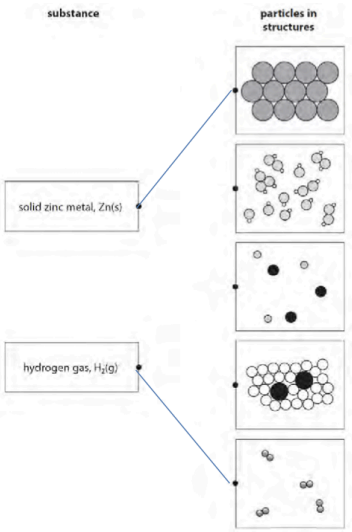
4(e)	high melting point / high boiling point / hard / insoluble (in water) / does not conduct (electricity)	ignore strong bonds ignore strong ignore values given ignore any other properties but reject contradictions to allowed answers	**(1)** AO 1 1

Q3. (2018)

8(a)	any two of the following • high melting points (1) • high boiling points (1) • malleable (1) • conduct electricity (1) • conduct heat (1) • high density (1) • shiny (1) • ductile (1) • strong (1) • sonorous (1)	 allow bendy as alternative to malleable ignore solid ignore hard allow good conductor for 1 mark	**(2)** AO 1 2

Q4. (2019) – 1d

1(d)



(2)

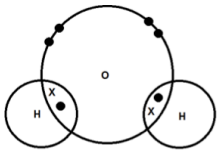
Each line 1 mark
Do not award mark if more than one line joins the left hand boxes with those on the right (2)

Q5. (2019) – 6c

6(c)(i) five / 5 (ions) | allow 2 + 3 | **(1)**

Q6. (2019) – 8e

8(e)



(2

shared pair of electrons in right hand overlap(1)
rest of molecule with 4 electrons drawn in outer shell of O only (1)

MP2 dependent on MP1

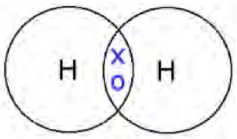
allow x or • or combinations thereof for any electrons

ignore inner shells of electrons even if incorrect

EXP
(2)

Q7. (2020) – 1b (iii)

1(b)(iii)



allow dots or crosses or mixture
allow other suitable symbols

(1)

Q8. (2020) – 4c (ii)

4(c)(ii) **B** ionic

A giant covalent structures do not conduct electricity at all
C metallic structures conduct when solid
D simple molecular structures do not conduct electricity when molten and have low melting points

(1)

Q9. (2020) – 4e

4(e) An explanation linking

- electrons (1)
- can move / are delocalised (1)

MP2 depends on MP1

allow charged particles can move / are delocalised (1)

(2)

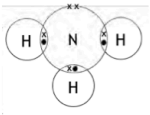
Q10. (2021) – 6b (iii)

6(b)(ii)	**A** electrode is the only correct answer. **B**, **C** and **D** are incorrect because they are not electrodes.	**(1)** **AO2**

Q11. (2021)

7(a)(i)	malleable / malleability	**(1)** **AO2**

Q12. (2022) – 1b (iii)

1(b)(iii)	**B**  is the only correct answer **A** is incorrect as there are no shared pairs and the nitrogen atom shown only has 3 electrons **C** is incorrect as there are no shared pairs **D** is incorrect as the nitrogen atom shown only has 3 electrons	**(1)** **AO2-1**

Q13. (2022) – 2c

2(c)	melting point (too) high / (temperature) below melting point / metals have high melting point / (water is) not hot enough	allow melting point higher (than chocolate) allow not enough {heat/ energy} / takes a lot of {heat / energy} allow metallic bonds are strong / no bonds have been broken (at temperature of water) ignore any statements referring to boiling point ignore 'hard to melt'	**(1)** **AO3-2b**

Q14. (2022) – 6c (iii)

6(c)(iii)	An explanation linking: • **electrons** (1) • move (through graphite) / are {delocalised / free / sea of electrons} (1)	 ignore 'charged particles' for MP1 but allow for MP2 reject ions for MP1 and MP2 'electrons in bonds/ electrons in outer shell' scores MP1 only MP2 depends on **electrons** or charged particles being mentioned ignore any other material about structure of graphite, correct or otherwise	**(2)** **AO1-1**

Q15. (2022) – 9a (ii)

9(a)(ii)	An explanation linking • **ions** (in magnesium carbonate) {cannot move / in a fixed position / held in a lattice / held together by strong electrostatic forces} (1) • magnesium contains {delocalised/free} **electrons** (1) • electrons (in magnesium) can {flow / move} / are mobile (1)	ignore charged particles throughout allow magnesium carbonate does not have {delocalised / free} electrons reject references to covalent bonding in magnesium carbonate for MP1 allow sea of electrons ignore ions in magnesium ignore carry a {charge / current}	**(3)** **AO2-1**

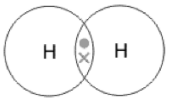
Q16. (2023)

6(a)(i) **Group B**	any one of the following • shiny • high {melting / boiling} point • good conductor of {electricity / heat} • malleable / ductile • grey coloured	 allow easily shaped / can be drawn into wires allow silver **coloured** ignore density / sonorous / solid ignore strength / strong / hard	**AO1-1** **(1)**

Q17. (2023) – 6d

6(d) **Group B**	A description to include ionic (max 2 marks) • (electrostatic) force between (oppositely charged) ions / between anions and cations (2) covalent (max 2 marks) • atoms share a **pair** electrons (2)	other creditable responses (max 1 mark) including any **one** from: • {ions / cations / anions} are charged particles • ionic bonds between metals and non-metals • electrons transferred (from metal to non-metal) • metals lose electrons / non-metals gain electrons reject electrons transferred from non-metal to metals other creditable responses (max 1 mark) including any **one** from: • covalent bonds are formed when electrons are shared • covalent bonds form molecules • covalent bonds between non-metals	**AO1-1** **(4)**

Q18. (2024) – 2a (ii)

2(a)(ii)		allow all dots or all crosses or a mixture of both allow dots/crosses with overlapped area OR on lines of the shells where overlapped	**(1)** **AO1-1**

Q19. (2024) – 9a (ii)

9(a)(ii)	an explanation linking SOLID • is an (ionic) lattice / (ions are) held by strong (electrostatic) attractions (1) • so the **ions** {cannot move / are fixed / just vibrate} (1) SOLUTION • in solution the **ions** {can move / are free} (1)	allow giant structure / regular arrangement / regular structure for lattice allow atoms / (charged) particles in MP1 only ignore electrons for MP1 reject molecules / elements reject electrons allow liquid for solution reject electrons reject intermolecular forces	**(3)** **AO2-1**