Unit 1 – Atomic Structure and Bonding REVISION PPQu MS

Q1.

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>(a)</td><td><table><tr><th>Start</th><th>End</th></tr><tr><td>solid</td><td>liquid</td></tr><tr><td>solid</td><td>gas</td></tr><tr><td>gas</td><td>liquid</td></tr><tr><td>liquid</td><td>gas</td></tr></table></td><td>Award 1 mark for each correct row

ALLOW gas to solid for sublimation</td><td>3</td></tr>
<tr><td>(b)</td><td>A description that refers to any three of the following points

M1 irregular /random arrangement (of particles)

M2 large gaps between them /far apart /widely spaced

M3 random movement / move freely

M4 move (very) quickly</td><td>

ALLOW spread out

IGNORE references to kinetic energy</td><td>3</td></tr>
<tr><td colspan="3"></td><td>6 marks</td></tr>
</table>

(**Q01 4CH1/1C, Jan 2021**)

Q2.

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>(a) (i)</td><td>14</td><td></td><td>1</td></tr>
<tr><td>(ii)</td><td>2.5</td><td>REJECT any charge shown

IGNORE brackets</td><td>1</td></tr>
<tr><td>(iii)</td><td>M1 same number of protons

M2 different numbers of neutrons</td><td>IGNORE references to numbers of electrons</td><td>2</td></tr>
<tr><td>(iv)</td><td>M1 (three) more electrons than protons

M2 electrons have a negative charge and protons have a positive charge</td><td>REJECT incorrect numbers of electrons</td><td>2</td></tr>
<tr><td>(b)</td><td>M1 (98.930 × 12) + (1.070 × 13) ÷ 100

M2 12.01</td><td>ALLOW 1 mark for 1201.07 if not divided by 100 as long as given to 2dp

correct answer to 2 decimal places with or without working scores 2 marks.</td><td>2</td></tr>
<tr><td></td><td></td><td></td><td>8</td></tr>
</table>

(**Q04 4CH1/1C, Nov 2021**)

Q3.

Question number	Answer	Notes	Marks
(a) (i)	M1 four electrons between the carbon and each oxygen M2 rest of molecule correct	 M2 dep on M1	2
(ii)	M1 shared pair(s) of electrons M2 attracted to (two) nuclei	 **REJECT** nucleus. Must be plural for **M2**. **M2** dep on mention of electrons in **M1**	2
(b) (i)	M1 Graphite has delocalised electrons M2 (delocalised electron(s)) can move or flow (throughout the structure)	**IGNORE** sea of electrons **IGNORE** free electrons **IGNORE** number of electrons **IGNORE** references to carrying a charge or current **IGNORE** references to layers **M2** dep on mentioning electrons in **M1** Any mention of ions scores 0	2
(ii)	M1 (diamond) giant covalent M2 (in melting diamond) covalent bonds are broken M3 (C_{60}) (simple) molecular structure M4 (in melting C_{60}) intermolecular forces (of attraction) are overcome M5 more energy is needed to break covalent bonds (in diamond) than intermolecular forces (in C_{60})	**ALLOW** macromolecular **ALLOW** giant structure if M2 is scored **IGNORE** tetrahedral structure **REJECT** molecules of diamond **ALLOW** description of covalent bonds **ALLOW** molecules of C_{60} **ALLOW** strong covalent bonds and weak intermolecular forces (or attraction) **ACCEPT** breaking bonds in C_{60} if intermolecular forces clearly mentioned Mention of intermolecular forces in diamond no **M2** or **M5** Mention of breaking covalent bonds in C_{60} no **M4** or **M5**	5

(**Q10 4CH1/1CR, Jan 2020**)

Q4.

(a) NH_4^+ 1

(b) (i)

M1 (molecules / particles of) ammonia move / diffuse faster **M2** because the ammonium chloride forms near(er) to the HCl **OR** because the ammonia has travelled further (in the same time)	**IGNORE** references to the masses / sizes of the particles	2

(b)(ii)

Any **two** from: **M1** (gas particles) move in random directions / don't travel in straight lines OWTTE **M2** (gas particles) collide with air / other particles **M3** (gas particles) collide with the walls / sides (of the tube) OWTTE	**ALLOW** air / other particles slow them down **IGNORE** any references to rate of reaction / collisions	2

Total for question: 5
(Q04 4CH1/1CR, Jan 2020 - adapted)

EXTENSION - Q5.

Question number	Answer	Notes	Marks
(a)	description including (formation of ions in lithium chloride involves) M1 lithium (atom) losing electron M2 chlorine (atom) gaining an electron (formation of covalent bonds in hydrogen chloride involves) M3 sharing a pair of electrons (one electron from each atom)	ALLOW correct dot-and-cross diagrams for ions for M1 and M2 ALLOW correct dot-and-cross diagram showing shared pair in hydrogen chloride for M3	3

(b)	explanation including five of the following points: (lithium chloride) M1 giant (ionic) structure M2 strong (electrostatic) forces of attraction M3 between oppositely charged ions (hydrogen chloride) M4 simple molecular structure M5 weak intermolecular forces of attraction M6 more (heat/thermal) energy needed to overcome forces/break bonds in lithium chloride (than intermolecular forces in hydrogen chloride) OWTTE	 ALLOW giant lattice ALLOW strong bonds ACCEPT positive and negative ions If any reference to molecules/atoms/covalent bonds/intermolecular forces/metallic bonds cannot score M2 M3 M6 ALLOW weak bonds between molecules ACCEPT reverse argument If description/implication of breaking covalent bonds in hydrogen chloride cannot score M5 M6	5
		(Total for Question = 8)	

(**Q07 4CH1/1CR, Jan 2021**)