Covalent Bonding

Mark Scheme 2

Level	IGCSE(9-1)
Subject	Chemistry
Exam Board	Edexcel IGCSE
Module	Single Award (Paper 2C)
Topic	Principles of Chemistry
Sub-Topic	Covalent Bonding
Booklet	Mark Scheme 2

Time Allowed: **22 minutes**

Score: **/18**

Percentage: **/100**

Grade Boundaries:

9	8	7	6	5	4	3	2	1
>90%	80%	70%	60%	50%	40%	30%	20%	10%

Question number	Expected answer	Accept	Reject	Marks
1 (a)	Giant (structure / lattice / atomic / molecular) Covalent Idea that (covalent) bonds are broken (Covalent bonds) are strong / many bonds (are broken) / lots of {energy/heat} required **NB No penalty for referring to graphite**	Macromolecular	Max 2 for mentioning of ionic or metallic bonding or Intermolecular forces Bonds loosened	1 1 1 1
(b)	Layers slide / slip / move over each other IGNORE particles in layers such as atoms, but REJECT if ions / molecules / electrons for first mark only Weak (intermolecular forces of) <u>attraction</u> between layers / weak van der Waals (forces of attraction) between layers IGNORE references to bonds <u>within</u> the layers	Sheets / planes slide Any indication that the forces are those of attraction, e.g. forces overcome / forces are broken / forces hold the layers together	Rows slide Any reference to <u>bonds</u> between layers / molecules	1 1
(c)	Delocalised electrons (which) move / mobile / flow IGNORE references to "carrying" charge / current		Refs to atoms / ions / molecules scores 0/2	1 1

1 (d)	Any two from: Not a giant structure IGNORE simple molecular Weak intermolecular (forces of) attraction / weak (forces of) attraction between molecules / weak van der Waals (forces of attraction) between molecules No covalent bonds break (when melting)	Smaller molecules / simpler structure than diamond Any indication that the forces are those of attraction, e.g. forces overcome / forces broken / forces hold the molecules together First and third marking points can be awarded for correct comparisons between the two structures, e.g. buckminsterfullerene is simple molecular whereas diamond is giant covalent scores the first mark; weak intermolecular forces of attraction in buckminsterfullerene are broken as opposed to the covalent bonds in diamond (scores the 3rd mark, as well as the 2nd)	MAX 1 for any mention of covalent bonds are broken in Buckminster fullerene Any reference to bonds between molecules	2

Total 10 Marks

Question number	Answer	Accept	Reject	Marks
2 (a)	D (a molecule)			1
(b)	A (covalent)			1
(c)	NH_3	H_3N		1

Total 3 marks

<table>
<tr><th colspan="3">Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>3</td><td>(a)</td><td></td><td>
<table>
<tr><th>Substance</th><th>Element or compound</th><th>Type of bonding</th></tr>
<tr><td>ammonia</td><td>compound</td><td></td></tr>
<tr><td>hydrogen chloride</td><td>(compound)</td><td>covalent</td></tr>
<tr><td>oxygen</td><td>element</td><td>(covalent)</td></tr>
<tr><td>magnesium oxide</td><td>compound</td><td></td></tr>
</table>
</td><td>Ignore qualifiers for covalent, eg polar / dative

All 6 correct = 3 marks

5 or 4 correct = 2 marks

3 or 2 correct = 1 mark

1 or 0 correct = 0 marks</td><td>3</td></tr>
<tr><td></td><td>(b)</td><td></td><td>B (MgO)</td><td></td><td>1</td></tr>
<tr><td></td><td>(c)</td><td></td><td>B (g)</td><td></td><td>1</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Total for Question 3</td><td>5</td></tr>
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