

## Mark schemes

### Q1.

(a) hydrogen

*in any order*  
*ignore H*

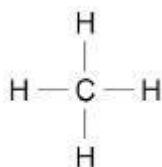
1

carbon

*ignore C*

1

(b)



1

(c) covalent

1

(d)  $\frac{12}{16} \times 100$

1

= 75 (%)

1

(e) any **one** from:

- catalytic (cracking)
- steam (cracking)

1

(f)  $\text{C}_{13}\text{H}_{28} \rightarrow \text{C}_8\text{H}_{18} + \text{C}_5\text{H}_{10}$

1

(g) fuels

1

(h)  $\text{C}_2\text{H}_4$

1

(i) poly(ethene)

*allow polythene*  
*allow (a) polymer*

1

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### Q2.

(a) (element)  
nitrogen

*allow N*

(reason)

any **one** from:

*MP2 dependent on MP1 being awarded*

- has an atomic number of 7
- has 7 electrons

*allow has an electronic structure of 2,5*

- has 7 protons

1

- (b) • 8 electrons on F **and** none on Na

1

- Na<sup>+</sup> **and** F<sup>-</sup>

an answer of:



can be awarded **2** marks

*allow any combination of dots, crosses, circles or e<sup>(-)</sup> for electrons*

1

- (c) (strong) electrostatic forces

1

of attraction

1

(between) oppositely charged ions

1

- (d) high melting point

1

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### Q3.

- (a) C<sub>60</sub>

1

- (b) (graphite has) delocalised electrons

1

(so the delocalised electrons) carry electrical charge through the structure

*allow (so the delocalised electrons) move through the structure*

1

- (c) carbon atoms have different sizes to iron atoms / ions

1

(so carbon atoms) distort the layers of iron atoms / ions

1

(therefore) the layers cannot slide

1

(d) (percentage and mass of other elements)

$$28.08 (\%) = 16.29 (\text{g})$$

1

$$(\text{mass of fork}) = \frac{16.29}{28.08} \times 100 (\text{g})$$

1

$$= 58.01 (\text{g})$$

1

$$(\text{mass of iron}) = \frac{71.92}{100} \times 58.01$$

71.92

*allow (mass of fork – mass of other elements) = 41.72 (g)*

*allow 41.7 (g)*

*allow correct use of incorrect calculation of mass and / or percentages*

1

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#### Q4.

(a) giant structure of ions

1

with strong electrostatic forces of attraction

*if no other mark awarded allow 1 mark for ionic bonding*

1

(b) (moles bromine =  $\frac{1}{160}$ )  
0.00625

1

(molecules of bromine =)  
 $0.00625 \times 6.02 \times 10^{23}$

*allow correct use of an incorrectly calculated value for moles of bromine*

1

(molecules of bromine =)  
 $3.76 \times 10^{21}$  (molecules)

*allow  $3.7625 \times 10^{21}$  (molecules)*

1

*allow converse*

(c) boiling point decreases up the group

*allow boiling point decreases down the table*

1

(because) the relative formula / molecular mass decreases

**or**

(because) the size of the molecule decreases

1

(so) the intermolecular forces decrease (in strength)

*allow (so) the forces between molecules  
decrease (in strength)*

1

(so) less energy is needed to overcome the intermolecular forces

*allow (so) less energy is needed to separate the  
molecules*

*do **not** accept a reference to breaking bonds  
unless specifically between molecules*

1

[9]