

## Mark schemes

### Q1.

- (a) (Group) 0  
or  
noble gases 1
- (b) B 1
- (c) A 1
- (d) (atoms with the) same number of protons  
*allow atoms with the same atomic number*  
*allow atoms of the same element*  
*ignore the same number of electrons* 1
- (but with) different numbers of neutrons  
*ignore (but with) different mass numbers*  
*do **not** accept (but with) different relative atomic mass* 1
- (e) 
$$\frac{(39 \times 93.1) + (41 \times 6.9)}{100}$$
  
= 39.138 1  
= 39.1 1  
*allow correctly rounded answer to 1 decimal place from an incorrect calculation using all the values given in the question* 1

[8]

### Q2.

- (a) noble gases 1
- (b) (both have) complete outer energy levels  
*allow shell for energy level*  
*allow 8 electrons in the outer / second energy level*  
*allow 2 electrons in the innermost energy level* 1
- (c) (different) number of energy levels / shells  
*allow different (total) number of electrons*  
*allow neon is 2,8 **and** argon is 2,8,8* 1

- (d) (y-axis) melting point in °C  
**and**  
(x-axis) relative atomic mass
- 1

all five points plotted correctly

*allow a tolerance of  $\pm \frac{1}{2}$  a small square*

*allow 1 mark for four points plotted correctly*

2

- (e) the higher the relative atomic mass, the lower the melting point

*allow converse*

*allow going down Group 1 the melting point decreases*

*ignore negative correlation*

1

[7]

### Q3.

- (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

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#### Q4.

(a) atomic weight

*do **not** accept atomic mass or  $A_r$*

1

(b) left gaps / spaces

**or**

changed the order based on atomic weights

*allow placed them in correct groups according to properties*

*do **not** accept reference to atomic number*

1

(c) weak forces between the molecules

**or**

weak intermolecular forces

*allow weak intermolecular bonds*

*do **not** accept incorrect references to covalent bonds*

1

(so) little energy required to overcome / break the forces between molecules

**or**

(so) little energy required to overcome / break the intermolecular forces

*allow (so) little energy required to separate the molecules*

*allow (so) little energy required to overcome / break the intermolecular bonds*

*ignore less energy*

1

(d)

*allow converse explanation in terms of boiling point*

(the) molecules get larger going down the group

1

(so the) forces between the molecules increase

**or**

(so the) intermolecular forces increase

1

(so the) boiling points increase going down the group

**or**

(so the) boiling points increase with increasing relative atomic mass

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

1

(e) 2,8

*allow diagram or description*

1

(so) stable arrangement of electrons

**or**

(so) full outer shell

1

(f)

*an answer of  $1.51 \times 10^{22}$  scores 2 marks*

$$\frac{1}{40} \times 6.02 \times 10^{23}$$

**or**

$$0.025 \times 6.02 \times 10^{23}$$

1

$$1.51 \times 10^{22}$$

*allow  $1.505 \times 10^{22}$*

1

**[11]**