

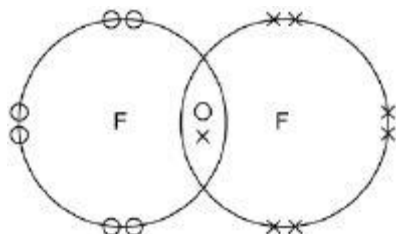
Mark schemes

Q1.

(a) group 7

1

(b)



*one shared pair anywhere in overlap between two circles **or** on intersection*

6 other electrons on each atom

*allow dots **or** crosses **or** mixture for all marks*

ignore any inner shell electrons

1

1

(c) bromine

1

potassium chloride

1

either order

allow correct chemical formulae

(d) displacement

1

(e) (an) electron

1

(f) smaller than

1

(g) (chlorine has) fewer levels / shells (of electrons)

allow converse for bromine

allow (chlorine has) fewer electrons

allow Cl has 3 levels / shells and Br has 4 levels / shells

ignore atomic number

***or** mass number*

***or** number of protons*

1

mark independent of answer to part (f)

(h) 3

allow multiples

1

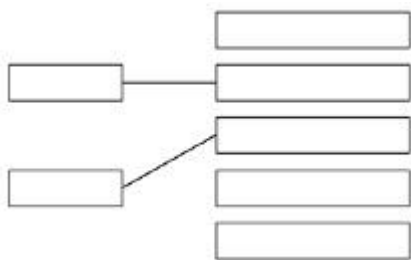
- (i) there are weak forces
do **not** accept weak bonds 1
- between molecules 1
- allow weak intermolecular forces for the first 2 marks*
- which require little energy to overcome / break
allow does not need much energy to boil 1

[13]

Q2.

- (a) group 0 1
- (b) left gaps 1
- in some places changed the order based on atomic weights 1

(c)



1
1

- (d) (electron) **A**
(neutron) **B**
(proton) **C**
3 correct answers scores 2 marks
1/2 correct answers scores 1 mark 2

- (e) $\frac{23}{6.02 \times 10^{23}}$ 1
- $3.820598... \times 10^{-23}$ 1
- 3.8×10^{-23}
an answer of 3.8×10^{-23} scores 3 marks 1

(f) $227 \times 10^{-12} \times \frac{1}{10\,000} \text{ m}$

1

[11]

Q3.

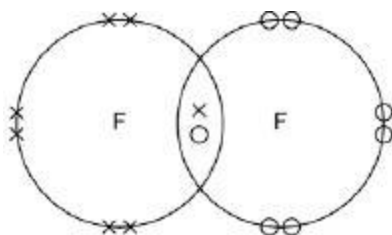
(a) g

do **not** accept upper case (G)

do **not** accept gas

1

(b)



one shared pair anywhere in overlap between two circles **or** on intersection

1

6 other electrons on each atom

1

allow dots **or** crosses **or** mixture for all marks

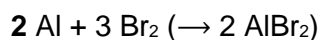
ignore any inner shell electrons

(c) 18

1

(d) AlBr_3

1



1

allow 1 mark for balancing their equation with an incorrect product

(e) chlorine is a smaller atom
or has fewer energy levels
or outer shell closer to nucleus

ignore chlorine has fewer electrons

1

chlorine has less shielding

or

has the greater attraction between the nucleus and the outer shell **or** incoming electron

1

therefore chlorine can gain an electron (into the outer shell) more easily

1

if no other marks awarded allow 1 mark for correct trend in reactivity in Group 7

do **not** accept reference to incorrect particles e.g. chloride atom

max 2 if outer shell / level not mentioned
'it' refers to chlorine
allow converse reasons for bromine being less
reactive

[9]

Q4.

- (a) if placed consecutively, then elements would be in wrong group / have wrong properties

allow some elements didn't fit pattern

1

left gaps

1

- (b) (elements placed in) atomic / proton number order

1

(elements in) same group have same number of outer electrons

1

any **one** from:

- number of protons = number of electrons
- reactions/(chemical) properties depend on the (outer) electrons
- number of shells gives the period

allow number of shells increases down the group

1

- (c) (i) (transition elements usually) have same / similar number of outer / 4th shell electrons

allow 2 electrons in outer shell

1

(because) inner (3rd) shell / energy level is being filled

ignore shells overlap

1

- (ii) 2nd shell / energy level can (only) have maximum of 8 electrons

accept no d-orbitals

or

2nd shell / energy level cannot have 18 electrons

1

[8]