

MARK SCHEME

GCSE

CHEMISTRY

AQA - TRIPLE SCIENCE

C2 - TEST 3

BONDING

Intermediate

Mark schemes

1.

(a) X – (metal) atom / ion

1

Y – electron

1

(b) free electrons or electrons move

1

(allow metal) atoms / ions to slide over each other

OR

bonding non - directional for 2 marks

1

[4]

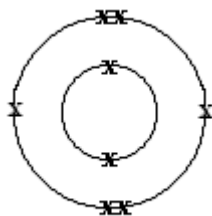
2.

(a) $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$

accept correct multiples / fractions

1

(b)



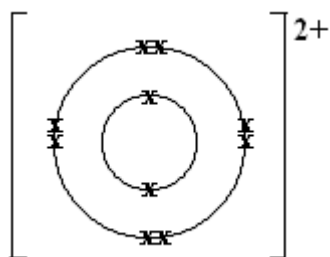
electrons do not need to be paired

accept dots / circles / e instead of crosses

*do **not** allow 2.6 without diagram*

1

(c)



electrons do not need to be paired
allow without bracket s/ must have the charge
accept dots / circles / e instead of crosses
ignore extra empty outer shells
ignore nucleus
*do **not** allow [2.8]²⁺ without diagram*

1

(d) oppositely charged (ions / atoms)

allow positive and negative(ions / atoms)

1

(they) attract

must be in correct context
accept held by electrostatic forces
ignore ionic bonding
***maximum 1** if they refer to intermolecular forces / attractions / covalent bonds*

1

(e) magnesium chloride

accept MgCl₂ (if correctly written)

1

[6]

3.

(a) electrons transferred from potassium to sulfur

1

two potassium atoms each lose one electron

1

forming K⁺ / 1+ ions

1

sulfur atoms gain 2 electrons

1

forming S²⁻ / 2- ions

1

(b) there are no gaps / sticks between the potassium ions and sulfide ions

1

(c) (two) shared pairs between H and S

1

rest correct - no additional hydrogen electrons and two non-bonding pairs on sulfur
second mark dependent on first

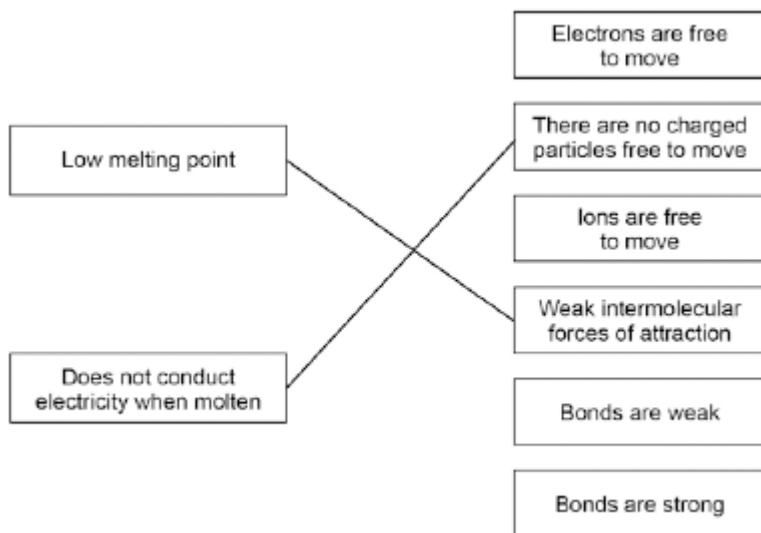
1

(d) 342

2

allow 1 mark for evidence of $(2 \times 27) + 3[32 + (16 \times 4)]$

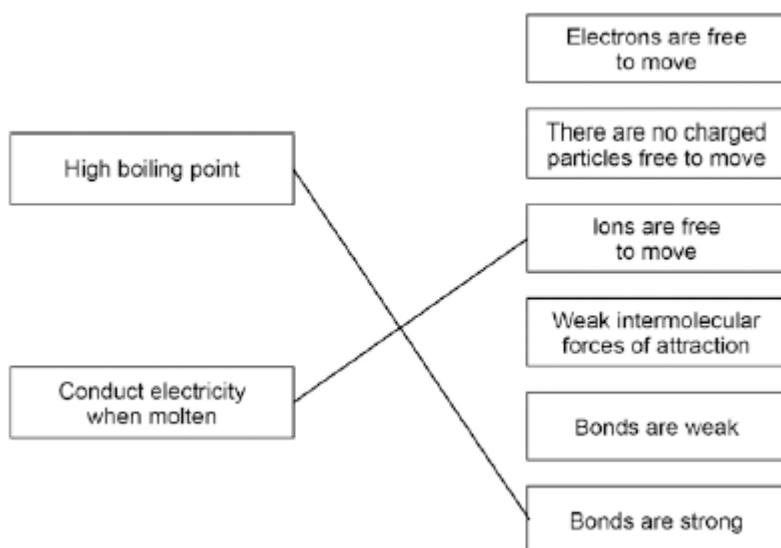
(e) **Property** **Explanation of property**



more than one line drawn from a variable negates the mark

2

(f) **Property** **Explanation of property**



more than one line drawn from a variable negates the mark

2

[14]

4.

(a) (i) 7 / seven

1

(ii) 1

do not accept -1

Electron

1

1

(iii) isotopes

1

(b) (i) (sodium +) fluorine → sodium fluoride

1

(ii) compounds

1

(iii) mole

1

(iv) sodium (atom) loses

1

fluorine (atom) gains

1

one electron

1

ions formed

1

allow sodium forms positive (ion) or fluorine forms negative (ion)

allow form ionic bond

allow to gain a full outer shell of electrons

allow forms noble gas structure

max 3 if reference to incorrect particle / bonding

(v) Dissolve in water

1

High melting point

1

[13]

5.

(a) giant structure / lattice / layers / close packed

first 3 marks can be obtained from a suitably labelled diagram

incorrect structure or bonding or particle = max 3

1

made up of atoms / positive ions

1

with delocalized / free electrons

1

so electrons can move / flow through the metal

accept so electrons can carry charge through the metal

accept so electrons can form a current

1

(b) an alloy (is a metal which) has different types / sizes of atoms

accept converse for pure metal throughout

both marks can be obtained from suitable diagrams

allow made of different metals

allow mixture of metals / atoms / elements

ignore particles

ignore properties

*do **not** accept compound*

1

alloy has distorted layers

allow layers are unable to slide

1

- (c) (i) can return to its original shape
accept shape memory alloy
accept smart alloy
ignore other properties 1
- (ii) (pure copper is too) soft
accept converse
accept malleable or bends
accept copper is running out
ignore references to strength and weakness 1
- (iii) aluminium oxide
accept alumina
accept Al_2O_3
ignore bauxite / aluminium ore 1
- (iv) any **one** from:
 - different conditions
 - different catalyst
 - different pressure*allow different concentration*
 - different temperature.*do **not** accept different monomers* 1
- (d) any **two** from:
 - accurate
 - sensitive
 - rapid
 - small sample.*both needed for 1 mark* 1
- [11]
6. (a) magnesium loses electrons
there are four ideas here that need to be linked in two pairs. 1
- two electrons 1
- chlorine gains electrons
magnesium loses electrons and chlorine gains electrons scores 2 marks. 1

two atoms of chlorine

magnesium loses two electrons and two chlorines each gain one electron will score full marks.

1

(b) 95

*correct answer with or without working gains 2 marks
if answer incorrect, allow 24 + 35.5 + 35.5 for 1 mark*

2

[6]

7.

(a) (alloy) atoms / ions / particles not in layers

accept layers are distorted

accept different (size) particles / atoms

1

so, (alloy) layers / atoms / ions / particles can't slide

if no other mark awarded allow (an alloy) is a mixture of metals for 1 mark

1

(b) diamonds have a giant covalent structure

1

diamonds have strong bonds between carbon atoms

1

(c) (i) a compound

1

(ii) CH₄

1

(iii) covalent

1

(d) methane has a low boiling point
or boiling point less than 20°C molecules

1

because it has small molecules

accept it has forces between molecules

accept weak forces between molecules for 2 marks

1

[9]

8.

(a) (i) 65

correct answer with or without working = 2 marks

if answer incorrect

evidence of (81 - 16) for 1 mark

ignore units

2

(ii) zinc

accept error carried forward from (a)(i)

allow correct symbol

answer given should be element / metal closest to their answer

*do **not** allow compounds*

1

(b) (i) • it loses electrons

sharing / covalency = max 1 mark

1

• three electrons

1

(ii) 8 electrons shown in second shell.

accept dots / crosses / mixture of dots and crosses / e

electrons do not need to be paired

*do **not** allow extra electrons in first shell*

1

[6]