

Name of the Student: _____

Max. Marks : 23 Marks

Time : 23 Minutes

Mark Schemes

Q1.

- (a) Macromolecular/giant covalent/giant molecular/giant atomic

If IMF/H-bonds/Ionic/metallic CE = 0/3

covalent bond between molecules CE = 0/3

If giant unqualified M1 = 0 but mark on

1

Many/strong covalent bonds

M2 and M3 can only be scored if covalent mentioned in answer

Ignore metalloid and carbon

Ignore bp

1

Bonds must be broken/overcome

Ignore numbers of bonds and references to energy

1

- (b) (Simple) molecular

QoL

Do not allow simple covalent for M1

Giant covalent/ionic/metallic, CE = 0

If breaking covalent bonds CE= 0/3

1

S bigger molecule (than P) or S₈ and P₄ references

QoL

Allow more electrons in sulfur molecule or S₈

Do not allow S is bigger than P

Allow S molecule has a bigger M_r

Do not allow contradictions

1

So more/stronger van der Waals' forces (to be broken or overcome)

Not just more energy to break

1

- (c) Regular arrangement of minimum of 6 particles in
minimum of 2 rows

Ignore e⁻

Do not allow ring arrangements OR structures bonded with electrons

1

+ charge in each one (of 6)

Allow +, (1+, 2+ or 3+) in ions/or in words

1

Rows/planes/sheets/layers (of atoms/ions) can slide (owtte)
over one another

M3 independent

If ionic bonding/molecules/IMF/vdw/covalent, penalise M3

Ignore layers of electrons sliding

1

(d) Bigger charge (3+ compared to 1+)

CE = 0 if molecules, ionic, covalent, IMF

(Allow Al^{2+})

OR smaller atom/ion in Al/more protons/bigger nuclear charge

1

More free/delocalised electrons (in Al)/bigger sea of electrons in Al

Accept 2 or 3 delocalised electrons compared to 1 in Na

1

Stronger metallic bonding/stronger (electrostatic) attraction
between the (+) ions or nuclei and the (delocalised) electrons
(or implied)

*Must be implied that the electrons are the delocalised ones not the
electrons in the shells.*

Accept converse arguments

1

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Q2.

(a) Cross between the Na cross and the Mg cross 1

(b) $\text{Al(g)} \rightarrow \text{Al}^+(\text{g}) + \text{e}^-$
 $\text{Al(g)} - \text{e}^- \rightarrow \text{Al}^+(\text{g})$
 $\text{Al(g)} + \text{e}^- \rightarrow \text{Al}^+(\text{g}) + 2\text{e}^-$
One mark for state symbols consequential on getting equation correct.
Electron does not have to have the – sign on it
Ignore (g) if put as state symbol with e^- but penalise state symbol mark
if other state symbols on e^- 2

(c) 2nd/second/2/II
 Only 1

(d) Paired electrons in (3)p orbital
Penalise wrong number
If paired electrons repel allow M2 1

repel 1

(e) Neon/Ne
No consequential marking from wrong element 1

$1\text{s}^2 2\text{s}^2 2\text{p}^6 / [\text{He}] 2\text{s}^2 2\text{p}^6$
Allow capital s and p
Allow subscript numbers 1

(f) Decreases
CE if wrong 1

Atomic radius increases/electron removed further from nucleus
 or nuclear charge/electron in higher energy level/Atoms
 get larger/more shells
Accept more repulsion between more electrons for M2
Mark is for distance from nucleus
Must be comparative answers from M2 and M3
CE M2 and M3 if mention molecules
Not more sub-shells 1

As group is descended more shielding 1

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