Practice Question Set For A-Level
Subject : Chemistry
Paper-1 Topic: Inorganic 2

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Name of the Student:_____
Max. Marks : 26 Marks **Time : 26 Minutes**

Mark Schemes

Q1.

(a) Macromolecular

Or giant molecule
Or giant covalent (also gains M2)
Do not allow giant atomic
Ionic/metallic CE=0 for all 3 marks

1

Covalent bonding (between atoms)

Do NOT allow if between molecules

1

Many/strong bonds to be broken (or lots of energy required)

Lose both bonding marks if contradiction e.g. mention of intermolecular forces
*Note: 'covalent bonds between molecules' loses M2 but **not** M3*

1

(b) Al_2O_3 ionic

Allow ionic + covalent/ionic with covalent character

1

(c) $2Al + 3/2O_2 \rightarrow Al_2O_3$

Allow multiples
Ignore state symbols

1

(d) Insoluble/impermeable/non-porous

Or does not react/inert
Do not allow thick layer
Must imply property of Al_2O_3 not Al

1

(e) $Na_2O + H_2O \rightarrow 2NaOH$

Or $Na_2O + H_2O \rightarrow 2Na^+ + 2OH^-$

1

(f) (i) $Al_2O_3 + 6HCl \rightarrow 2AlCl_3 + 3H_2O$

Ionic equations with Al_2O_3 possible
e.g. $Al_2O_3 + 6H^+ \rightarrow 2Al^{3+} + 3H_2O$
Do not allow formation of Al_2Cl_6

1

(ii) $Al_2O_3 + 2NaOH + 3H_2O \rightarrow 2NaAl(OH)_4$

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Other equations with Al_2O_3 are possible e.g.
$Al_2O_3 + 2OH^- + 3H_2O \rightarrow 2[Al(OH)_4]^-$
$Al_2O_3 + 2OH^- + 7H_2O \rightarrow 2[Al(H_2O)_2(OH)_4]^-$

1

(g) SiO_2 acidic/Lewis acid/electron pair acceptor

1

$SiO_2 + 2NaOH \rightarrow Na_2SiO_3 + H_2O$

*Allow SiO_2 **not** amphoteric*
Do NOT allow BL acid

Other equations with SiO_2 are possible e.g.
$SiO_2 + 2OH^- \rightarrow SiO_3^{2-} + H_2O$
$SiO_2 + 2OH^- + 2H_2O \rightarrow Si(OH)_6^{2-}$

1

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Q2.

(a) Electronegativity increases

1

Proton number increases (increase in nuclear charge)

1

Same number of electron shells/levels

Or same radius or Shielding of outer electrons remains the same

1

Attraction of bond pair to nucleus increases

Allow 'electrons in bond' instead of 'bond pair'

1

(b) Big difference in electronegativity leads to ionic bonding, smaller covalent

Lose a mark if formula incorrect

1

Sodium oxide ionic lattice

1

Strong forces of attraction between ions

1

P_4O_{10} covalent molecular

Must have covalent and molecular (or molecules)

1

Weak (intermolecular) forces between molecules

Or weak vdW, or weak dipole–dipole between molecules

1

melting point Na_2O greater than for P_4O_{10}

Or argument relating mpt to strength of forces

1

(c) Moles NaOH = 0.0212 × 0.5 = 0.0106

M1 moles of NaOH correct

1

Moles of H_3PO_4 = 1/3 moles of NaOH (= 0.00353)

M2 is for 1/3

1

Moles of P in 25000 l = $0.00353 \times 10^6 = 3.53 \times 10^3$

M3 is for factor of 1,000,000

1

Moles of $P_4O_{10} = 3.53 \times 10^3/4$

M4 is for factor of 1/4 (or 1/2 if P_2O_5)

1

Mass of $P_4O_{10} = 3.53 \times 10^3/4 \times 284 = 0.251 \times 10^6$ g

= 251 kg

(Or if P_2O_5 $3.53 \times 10^3/2 \times 142$)

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M5 is for multiplying moles by M_r with correct units
allow conseq on incorrect M4
(allow 250-252)

1

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