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

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Name of the Student:_____
Max. Marks : 25 Marks **Time : 25 Minutes**

Mark Schemes

Q1.

(a) $4Na + O_2 \rightarrow 2Na_2O$

Ignore state symbols
Allow multiples and fractions
Allow $2Na + O_2 \rightarrow Na_2O_2$

1

Yellow/orange flame/light AND white solid/powder/smoke/fumes/ash

Allow yellow solid
Do not allow ppt. Apply list principle
Ignore formulae in observations

1

(b) $4P + 5O_2 \rightarrow P_4O_{10}$ / $P_4 + 5O_2 \rightarrow P_4O_{10}$

Ignore state symbols
Do not allow equations with P_2O_5
Allow $4P + 3O_2 \rightarrow P_4O_6$ / $P_4 + 3O_2 \rightarrow P_4O_6$

1

white flame/light OR white fumes/smoke/solid/powder/ash

Do not allow ppt. Apply list principle

1

(c) Greater/increased charge/charge density on magnesium ion/Mg^{2+} (specific mention of ion(s) can be scored from M2)

Allow magnesium ion is smaller (than sodium ion);
Ignore atomic radius
If mention of molecules, intermolecular forces, metallic bonding then CE=0

1

Stronger attraction for anions/oxide ion / stronger attraction between oppositely charged ions/ stronger attraction between Mg^{2+} and O^{2-} / stronger ionic bonding

Ignore references to covalent character
Mark independently

1

(d) (SiO_2) giant covalent / macromolecular

Do not allow M1 and M2 if it is clear that the candidate is referring to the structure of the elements rather than the oxides. M3 could score from correct comparison of giant covalent to simple molecular
Allow giant molecule

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1

(P_4O_{10}) (simple) molecular

Not simple covalent

1

(Covalent) bonds (throughout structure) of SiO_2 much stronger than the <u>forces between molecules/intermolecular forces</u> in P_4O_{10}

Reference to 'between molecules' in M3 would also get M2

Allow van der Waals' forces between molecules

M3 dependent on correct <u>M1</u> and <u>M2</u>

1

(e) **M1** Sample in suitable melting point apparatus (e.g. capillary in oil bath/Thiele tube / melting point apparatus)

Do not allow water bath

1

M2 Heat slowly/gradually/gently (to establish melting point range)

1

M3 Lower melting point / (broad) range of melting point indicates presence of impurities

OR melting point agrees with/close to data book value / melts sharply/over narrow range / melting point exactly 573K indicates purity

1

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Q2.

(a) $P_4 + 5\ O_2 \longrightarrow P_4O_{10}$

allow 4 P + 5 $O_2 \longrightarrow P_4O_{10}$

allow multiples

ignore state symbols

1

(b) React with water / add water / solution (of substances in question)

If no M1 then CE = 0/3

1

Add litmus paper / universal indicator / measure pH (with pH meter)

Allow other reagents in solution, e.g. sodium carbonate solution, that give a positive result

Allow other indicators with appropriate colour changes

1

M3 is dependent on M2

Litmus: blue with sodium oxide (solution) **and** red with phosphorus oxide (solution)OR
If blue litmus added phosphorus oxide solution goes red OR
If red litmus added sodium (hydr)oxide goes blue

Universal Indicator: blue/ purple with sodium oxide (solution) **and** red with phosphorus oxide (solution)

pH meter or Universal Indicator: sodium (hydr)oxide (solution) has a higher pH (than phosphorus oxide (solution)) or vv

sodium (hydr)oxide pH (12 to 14) **and** phosphorus oxide (solution) pH (-1 to 2)

For pH meter or Universal Indicator: allow sodium (hydr)oxide (solution) has a higher pH and phosphorus oxide (solution) has lower pH.

1

(c) For silicon dioxide - giant covalent (molecule)/ macromolecular

1

For sulfur trioxide - molecular / (simple) molecule

1

Do not allow simple covalent

(d) Covalent bonds (between atoms) in SiO_2

1

Van der Waals between molecules / intermolecular forces in SO_3

1

Covalent bonds are stronger than van der Waals forces

1

(Covalent bonds) take more energy to be overcome/broken or (Van der Waals) take less energy to be overcome/broken

1

If covalent bonds between molecules of SiO_2 lose M1 only

If hydrogen bonds in SO_3 lose M2 only

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If metallic or ionic max score = 1 (either M1 or M2)
If IMF in SiO_2 then max 1 (M2 only)
Allow dipole-dipole forces between molecules
For M3 and M4 comparison is required/implied

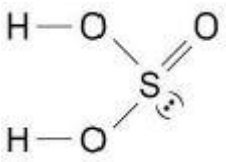
(e) $SO_3 + 2KOH \longrightarrow K_2SO_4 + H_2O$
$SO_3 + KOH \longrightarrow KHSO_4$
$SO_3 + 2OH^- \longrightarrow SO_4^{2-} + H_2O$
$SO_3 + OH^- \longrightarrow HSO_4^-$
Allow multiples
Ignore state symbols

1

(f) $3\ MgO + 2\ H_3PO_4 \longrightarrow Mg_3(PO_4)_2 + 3\ H_2O$
Allow multiples
Ignore state symbols

1

(g)



Ignore lone pairs

1

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