

Name of the Student: \_\_\_\_\_

Max. Marks : 27 Marks

Time : 27 Minutes

## Mark Schemes

Q1.

- (a) (i) Ionic lattice / solid / giant ionic  
*CE = 0/2 if molecules / IMFs / atoms / metallic*  
 1
- Strong (electrostatic) forces/attraction between ions  
*Allow strong ionic bonds for M2 only*  
*Allow lot of energy to break ionic bonds*  
 1
- (ii) Molecular/molecules  
 1
- Weak dipole-dipole and/or van der Waals forces between molecules  
*QoL*  
*Type of force must be mentioned*  
 1
- (b)  $P_4O_{10}$  bigger molecule/has larger surface area than  $SO_2$   
*Allow  $M_r$  of  $P_4O_{10}$  greater than for  $SO_2$*   
*If  $P_4O_{10}$  macromolecule/ionic, CE = 0/2*  
 1
- van der Waals forces between molecules stronger  
*Allow stronger IMF*  
 1
- (c)  $Na_2O + H_2O \rightarrow 2Na^+ + 2OH^-$   
*Allow  $2NaOH$*   
 1
- 14  
*Allow 12–14*  
 1
- $P_4O_{10} + 6H_2O \rightarrow 4H_3PO_4$   
*Allow ions*  
 1
- 0  
*Allow –1 to +2*  
 1
- (d)  $6Na_2O + P_4O_{10} \rightarrow 4Na_3PO_4$

*Allow ionic*

*Allow correct formula of product with atoms in any order*

1

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Q2.

- (a) (i) white flame / white light  
*Mark flame independent of other observations*  
1
- solid / powder / smoke / ash / white fumes  
*penalise precipitate*  
*penalise wrong colour*  
*if more than one observation for M2 apply list principle. (If an observation is incorrect, the incorrect observation negates a correct one)*  
1
- $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$   
*ignore state symbols*  
*allow multiples*  
1
- ionic  
*do not allow reference to covalent character*  
1
- (ii) blue flame  
*do not allow any other colour*  
*Mark flame independent of other observations*  
1
- fumes or misty or pungent/choking/smelly gas  
*do not allow incorrect smell (e.g. bad eggs)*  
*apply list principle as in (a) (i)*  
*do not allow just 'gas' or 'colourless gas'*
- $\text{S} + \text{O}_2 \rightarrow \text{SO}_2$   
*ignore state symbols*  
*allow multiples and  $\text{S}_8$*   
1
- covalent  
*penalise giant covalent*  
1
- (b) ionic  
*If covalent, can only score M3*  
1
- $\text{O}^{2-}$  / oxide ion reacts with water / accepts a proton  
*M2 requires reference to  $\text{O}^{2-}$  / oxide ion*  
1
- forming  $\text{OH}^-$  ions/ NaOH / sodium hydroxide  
(can show in equation from  $\text{Na}_2\text{O}$  even if incorrect)  
*allow*  
1
- $\text{O}^{2-} + \text{H}_2\text{O} \rightarrow 2\text{OH}^-$  or

$O^{2-} + H^+ \rightarrow OH^-$  to score M2 & M3  
also allow equations with spectator  $Na^+$  ions on both sides.

1

- (c) (heat until) molten  
or dissolve in molten cryolite  
do not allow solution in water

1

conducts electricity / can be electrolysed / electrolyse and  
identify Al /  $O_2$  at an electrode

M2 can only be gained if M1 scored

1

- (d) insoluble (in water)  
allow oxide impermeable to air / water  
or oxide is unreactive / inert

1

- (e) (i)  $Al_2O_3 + 6H^+ \rightarrow 2Al^{3+} + 3H_2O$   
allow  $O^{2-} + 2H^+ \rightarrow H_2O$   
and formation of aquated  $Al^{3+}$  species  
allow spectator  $Cl^-$  ions  
penalise  $HCl$  (not ionic!)

1

- (ii)  $Al_2O_3 + 2OH^- + 3H_2O \rightarrow 2Al(OH)_4^-$   
or  $Al_2O_3 + 6OH^- + 3H_2O \rightarrow 2Al(OH)_6^{3-}$   
allow formation of  $Al(H_2O)_2(OH)_4^-$   
allow  $Na^+$  spectator ions  
penalise  $NaOH$  (not ionic!)

1

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