

Name of the Student: _____

Max. Marks : 27 Marks

Time : 27 Minutes

Mark Schemes

Q1.

- (a) forms a solution with pH = 14 at 25°C
auto

1

- (b) $\text{Al}_2\text{O}_3 + 3\text{H}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + 3\text{H}_2\text{O}$
allow multiples
ignore state symbols

1

- (c) universal indicator

1

$\text{SO}_2(\text{aq})$ orange-red

1

$\text{SO}_3(\text{aq})$ red

1

allow correct comparison of acidic colours (red, orange, yellow)

or

pH meter

$\text{SO}_2(\text{aq})$ pH 2-3

$\text{SO}_3(\text{aq})$ pH 0-1

allow correct comparison of acidic pH ignoring values

or

any named metal carbonate (**or** formula) **or** Mg **or** Ca **or** Zn

$\text{SO}_2(\text{aq})$ slower effervescence

$\text{SO}_3(\text{aq})$ faster effervescence

if reagent is incomplete lose M1 and mark on

allow observation

allow correct comparison

allow named oxidising agent

*eg (acidified) KMnO_4 **or** (acidified) $\text{K}_2\text{Cr}_2\text{O}_7$*

$\text{SO}_2(\text{aq})$ correct colour acidified change

*$\text{SO}_3(\text{aq})$ no visible change **or** NVC*

allow (acidified) barium chloride solution

***or** allow (acidified) barium chloride solution*

*$\text{SO}_2(\text{aq})$ no visible change **or** NVC*

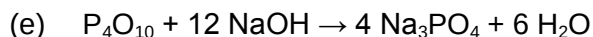
$\text{SO}_3(\text{aq})$ white precipitate

(d) $^{31}\text{P}_4^+$

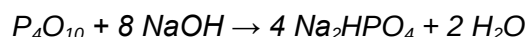
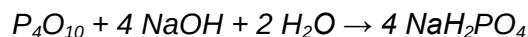
Allow $\text{P}_4^+ = 1$ mark

Allow $^{31}\text{P} = 1$ mark

2

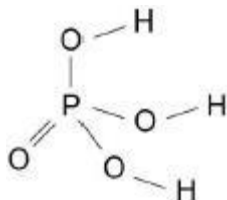


allow formation of acid salts



1

(f)



must show all bonds

1

(g) This question is marked using levels of response. Refer to the Mark Scheme Instructions for Examiners for guidance on how to mark this question.

Level 3 5-6 marks	All stages are covered and the description of each stage is generally correct and virtually complete. Answer is communicated coherently and shows a logical progression from stage 1 to stage 2 and stage 3.
Level 2 3-4 marks	All stages are covered but the description of each stage may be incomplete or may contain inaccuracies OR two stages are covered and the explanations are generally correct and virtually complete. Answer is mainly coherent and shows progression from stage 1 to stage 2 and/or stage 3.
Level 1 1-2 marks	Two stages are covered but stage(s) may be incomplete or may contain inaccuracies OR only one stage is covered but is generally correct and virtually complete. Answer includes isolated statements and these are presented in a logical order.
0 marks	Insufficient correct chemistry to gain a mark.

indicative chemistry content

contradictions negate statements

Stage 1 structure

1a NaCl ionic lattice **or** giant ionic

1b Cl_2 **and** HCl molecular (covalent)
or
 Cl_2 **and** HCl (simple) molecules

Stage 2 forces responsible for melting point

2a NaCl attractions between + and – ions

2b Cl_2 vdw forces

2c HCl dipole dipole forces

Stage 3 comparison of melting point

3a ionic bonds stronger than IMF

3b chlorine/ Cl_2 is a bigger (molecule) than HCl

or

chlorine/ Cl_2 has more electrons than HCl

3c more/stronger forces between molecules in Cl_2 than those in HCl

or

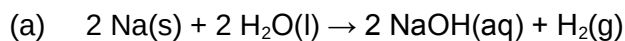
more/stronger IMF in Cl_2 than those in HCl

or

vdw between molecules in Cl_2 > dipole dipole between molecules in HCl

[15]

Q2.



Allow ionic equations

Allow multiples

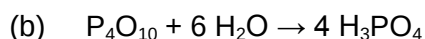
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Temperature will go up more **or** reactants can shoot out of the tube

Allow the mixture could explode or glass could shatter or hydrogen could ignite/is flammable

Ignore reaction is exothermic/vigorous

1



Allow ionic equations

1

Allow -1 to + 1

Do not allow equations from P_2O_5

1



Do not allow giant, giant atomic or giant ionic

1

M2 Strong covalent bonds (between atoms) or covalent bonds need a lot of energy to be broken/overcome

1

M3 P_4O_{10} is molecular or simple covalent molecule

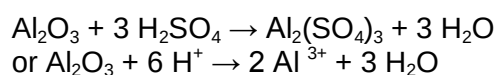
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M4 Weak van der Waals forces between molecules or van der Waals forces between molecules break easily

1



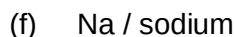
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[12]