



EXAM PAPERS PRACTICE

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Detailed mark scheme

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Level: CIE AS and A Level (9701)

Subject: Chemistry

Topic: CIE Chemistry

Type: Mark Scheme

2002



1583

Chemistry CIE AS & A Level
To be used for all exam preparation for 2025+

CHEMISTRY

AS and A

This to be used by all students studying CIE AS and A level Chemistry (9701) But students of other boards may find it useful

Mark Scheme

Answer 1

The correct answer is C because:

- In period 3 the following oxides produce an acidic solution when added to water:
 - Phosphorus oxide: $P_4O_6 + 6H_2O \rightarrow 4H_3PO_3$ or $P_4O_{10} + 6H_2O \rightarrow 4H_3PO_4$
 - Sulfur dioxide: $SO_3 + H_2O \rightarrow H_2SO_4$
 - H_3PO_3 , H_3PO_4 and H_2SO_4 are all acids because they dissociate in water, releasing H^+ ions.
- Therefore, arsenic and selenium oxides will also produce an acidic solution.

A is incorrect as aluminium (and therefore Ga) oxide does not react simply with water because despite containing oxide ions, they are held too strongly in the solid lattice to react with the water. Silicon (and therefore Ge) oxide does not react with water because it has a giant covalent structure.

B is incorrect as silicon (and therefore Ge) oxide does not react with water because it has a giant covalent structure.

D is incorrect as phosphorous (and therefore As) oxides also react with water to produce an acidic solution.

Answer 2

The correct answer is D because:

- Chlorine has the smallest atomic radius in period 3 (other than argon) because it has the largest number of protons and therefore the highest nuclear charge.
- A bigger nuclear charge means a greater pull on the electrons to the nucleus, reducing the atomic radius, so atomic radius reduces across a period.
- As argon is unreactive, X must be chlorine.
- Phosphorus (P_4) and sulfur (S_8) are simple covalent molecules, so the melting point is determined by the energy required to break van der Waals' forces between molecules.
- However, there are more electrons in sulfur molecules so phosphorus has a lower melting point than sulfur. Only chlorine and argon have lower melting points in Period 3.
- Therefore, the information is consistent with Y being phosphorous and Z being PCl_3 .



Answer 3

The correct answer is C because:

- Phosphorus trichloride, PCl_3 is a simple covalent chloride, a liquid at room temperature.
 - It will not conduct electricity due to the lack of ions or mobile electrons.
 - It reacts violently with water to produce phosphorus acid H_3PO_3 and hydrogen chloride.
 - $PCl_3 + 3H_2O \rightarrow H_3PO_3 + 3HCl$
- Silicon tetrachloride, $SiCl_4$ is a simple covalent chloride, a colourless liquid at room temperature.
 - It will not conduct electricity due to the lack of ions or mobile electrons.
 - It reacts violently with water to produce silicon dioxide and hydrogen chloride.
 - $SiCl_4 + 2H_2O \rightarrow SiO_2 + 4HCl$

Compound 1 could not be X as magnesium chloride dissolves in water and will conduct electricity in its liquid state when the ions become free on melting