

# 11. Group 17

## 11.1 Physical properties of the Group 17 elements

### Paper 1

#### Question Paper

- 1** The table shows statements about some of the properties of halogens and their compounds and explanations for these properties.

Which row shows a correct statement about the property and a correct explanation for the statement?

	statement	explanation
<b>A</b>	iodine is a solid at room temperature	the I–I bond strength is high
<b>B</b>	the decomposition of hydrogen iodide is more endothermic than the decomposition of hydrogen chloride	chlorine is more reactive than iodine
<b>C</b>	when chlorine is bubbled into aqueous potassium iodide, a purple solution is seen	chlorine is a stronger oxidising agent than iodine
<b>D</b>	when concentrated sulfuric acid is added to solid potassium iodide, a purple vapour is seen	iodide ions are being oxidised to iodine by the sulfuric acid

- 2** Iodine has a higher melting point than chlorine.

What is the reason for this?

- A** Iodine has stronger covalent bonds than chlorine.  
**B** Iodine molecules have stronger permanent dipoles than chlorine molecules.  
**C** Iodine is more volatile than chlorine.  
**D** Iodine has stronger instantaneous dipole–induced dipole forces than chlorine.

- 3** X, Y and Z are three elements in Group 17.

$X_2$  has weaker covalent bonds than  $Y_2$ .

$X_2$  has stronger instantaneous dipole–induced dipole forces between its molecules than  $Z_2$ .

$Y_2$  is a stronger oxidising agent than  $Z_2$ .

What could be X, Y and Z?

	X	Y	Z
<b>A</b>	Br	Cl	I
<b>B</b>	Cl	Br	I
<b>C</b>	I	Br	Cl
<b>D</b>	I	Cl	Br

- 4 The volatility of the Group 17 elements, chlorine, bromine and iodine, decreases down the group.

What is responsible for this trend?

- A bond length in the halogen molecule
- B bond strength in the halogen molecule
- C electronegativity of the halogen atom
- D number of electrons in the halogen atom

- 5 Chlorine and bromine have different volatilities.

Which row identifies the more volatile of the two elements, and gives the correct explanation?

	identity of the more volatile element	explanation for the difference in volatility
A	bromine	instantaneous dipole-induced dipole forces are greater in bromine than they are in chlorine
B	bromine	instantaneous dipole-induced dipole forces are greater in chlorine than they are in bromine
C	chlorine	instantaneous dipole-induced dipole forces are greater in bromine than they are in chlorine
D	chlorine	instantaneous dipole-induced dipole forces are greater in chlorine than they are in bromine

- 6 The properties of chlorine, bromine and their compounds are compared.

Which property is **smaller** for chlorine than for bromine?

- A bond strength of the hydrogen-halide bond
- B first ionisation energy
- C solubility of the silver halide in  $\text{NH}_3(\text{aq})$
- D strength of the van der Waals' forces between molecules of the element

- 7 Which row correctly describes the properties of the halogens as Group 17 is descended from chlorine to iodine?

	volatility	strength as oxidising agent
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

- 8 In this question, X represents an atom of chlorine, bromine or iodine.

Which explanation for the variation in volatility down Group 17 is correct?

- A** Instantaneous dipole-induced dipole forces between molecules become stronger.
- B** Permanent dipole-permanent dipole forces between molecules become stronger.
- C** The bond energy of the  $X_2$  molecules decreases.
- D** The first ionisation energy  $X(g) \rightarrow X^+(g) + e^-$  decreases.