AHL Worksheet – Chapter 3

1 Draw Lewis structures for the following: [7]

a BrF_3 **d** ICl_4^- **g** F_3ClO_2

b ClO_4^- **e** BrF_2^+

c BrF_5 **f** ClF_2^-

2 Draw Lewis structures for the following: [8]

a XeF_2 **d** XeO_4 **g** XeF_5^+

b XeO_3 **e** XeO_2F_2 **h** XeO_6^{4-}

c XeF_3^+ **f** XeO_3F_2

3 Predict the shapes and suggest bond angles for the following molecules/ions: [30]

a BrF_3 **f** ClF_2^- **k** XeO_4

b ClO_4^- **g** F_3ClO_2 **l** XeO_2F_2

c BrF_5 **h** XeF_2 **m** XeO_3F_2

d ICl_4^- **i** XeO_3 **n** XeF_5^+

e BrF_2^+ **j** XeF_3^+ **o** XeO_6^{4-}

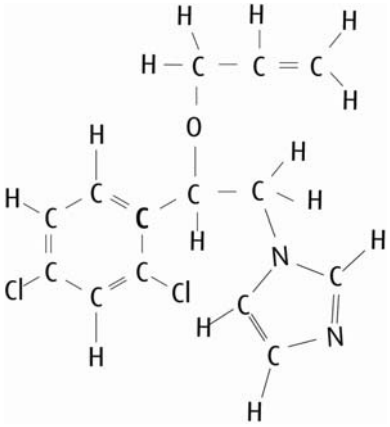
4 Suggest the hybridisation at the atom shown in bold in each of the following: [8]

a $H_2\mathbf{S}$ **d** $\mathbf{N}O_2^+$ **g** $H_3\mathbf{O}^+$

b $\mathbf{P}H_3$ **e** $F_2\mathbf{C}CF_2$ **h** HO**O**H

c $\mathbf{C}O_2$ **f** $H_2\mathbf{N}NH_2$

5 The structure of imazalil is shown. Imizalil isused as a fungicide.



a Give the molecular formula of imazalil. [1]

b What is the hybridisation of the C marked in bold in the molecule? [1]

c How many sp^2 hybridised carbon atoms are there in the molecule? [1]

d How many sp hybridised carbon atoms are there in the molecule? [1]

e How many lone pairs are there in the molecule? [1]

f Suggest a value for the C–O–C bond angle. [1]

g How many σ bonds are there in the molecule? [1]

h How many π bonds are there in the molecule? [1]

i Would you expect there to be hydrogen bonding between molecules of imazalil? Explain your answer. [1]

j Would you expect imazalil to be soluble in water? Explain your answer. [1]

6 Draw a diagram showing the σ and π bonding in a molecule of ethene, C_2H_4. [2]

7 **a** Give the formula of the carbonate ion. [1]

b Draw a Lewis structure for the carbonate ion. [1]

c Some C–O bond lengths are given in the following table:

	Bond length / nm
C–O	0.143
C=O	0.122
C≡O	0.113

Explain why all the C–O bond lengths are equal in the carbonate ion and suggest a value for the C–O bond length in the carbonate ion. [3]

d Suggest the C–O bond order in the carbonate ion. [1]

8 Predict and explain which of the two molecules below will have the higher melting point. [4]