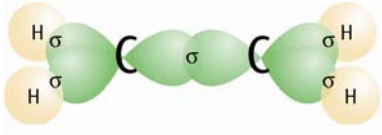
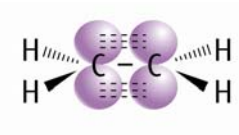
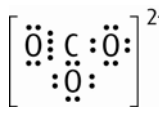


## Marking scheme for AHL Worksheet – Chapter 3

- 1 a  $\begin{array}{c} \text{:F:Br:F:} \\ \text{:F:} \end{array}$  [1]
- b  $\left[ \begin{array}{c} \text{:O:} \\ \text{:O:Cl:O:} \\ \text{:O:} \end{array} \right]^-$  [1]
- c  $\begin{array}{c} \text{:F:F:} \\ \text{:F:Br:F:} \\ \text{:F:} \end{array}$  [1]
- d  $\left[ \begin{array}{c} \text{:Cl:} \\ \text{:Cl:I:Cl:} \\ \text{:Cl:} \end{array} \right]^-$  [1]
- e  $\left[ \text{:F:Br:F:} \right]^+$  [1]
- f  $\left[ \text{:F:Cl:F:} \right]^-$  [1]
- g  $\begin{array}{c} \text{:F:F:} \\ \text{:F:Cl:O:} \\ \text{:O:} \end{array}$  [1]
- 2 a  $\text{:F:Xe:F:}$  [1]
- b  $\begin{array}{c} \text{:O:} \\ \text{:O:Xe:O:} \\ \text{:O:} \end{array}$  [1]
- c  $\left[ \begin{array}{c} \text{:F:} \\ \text{:F:Xe:F:} \\ \text{:F:} \end{array} \right]^+$  [1]
- d  $\begin{array}{c} \text{:O:} \\ \text{:O:Xe:O:} \\ \text{:O:} \end{array}$  [1]
- e  $\begin{array}{c} \text{:F:} \\ \text{:O:Xe:O:} \\ \text{:F:} \end{array}$  [1]
- f  $\begin{array}{c} \text{:F:F:} \\ \text{:O:Xe:O:} \\ \text{:O:} \end{array}$  [1]
- g  $\left[ \begin{array}{c} \text{:F:F:} \\ \text{:F:Xe:F:} \\ \text{:F:} \end{array} \right]^+$  [1]
- h  $\left[ \begin{array}{c} \text{:O:} \\ \text{:O:O:} \\ \text{:O:Xe:O:} \\ \text{:O:} \end{array} \right]^{4-}$  [1]

<b>3</b>	<b>a</b>	T-shaped; 85–90°	[2]
	<b>b</b>	tetrahedral; 109.5°	[2]
	<b>c</b>	square pyramidal; 85–90°	[2]
	<b>d</b>	square planar; 90°	[2]
	<b>e</b>	bent; 100–108°	[2]
	<b>f</b>	linear; 180°	[2]
	<b>g</b>	trigonal bipyramidal; 90°/120°	[2]
	<b>h</b>	linear; 180°	[2]
	<b>i</b>	trigonal pyramidal; 100–108°	[2]
	<b>j</b>	T-shaped; 85–90°	[2]
	<b>k</b>	tetrahedral; 109.5°	[2]
	<b>l</b>	square pyramidal; 85–90°	[2]
	<b>m</b>	trigonal bipyramidal; 90°/120°	[2]
	<b>n</b>	trigonal bipyramidal; 90°/120°	[2]
<b>o</b>	octahedral; 90°	[2]	
<b>4</b>	<b>a</b>	sp <sup>3</sup>	[1]
	<b>b</b>	sp <sup>3</sup>	[1]
	<b>c</b>	sp	[1]
	<b>d</b>	sp	[1]
	<b>e</b>	sp <sup>2</sup>	[1]
	<b>f</b>	sp <sup>3</sup>	[1]
	<b>g</b>	sp <sup>3</sup>	[1]
	<b>h</b>	sp <sup>3</sup>	[1]
<b>5</b>	<b>a</b>	C <sub>14</sub> H <sub>14</sub> Cl <sub>2</sub> N <sub>2</sub> O	[1]
	<b>b</b>	sp <sup>2</sup>	[1]
	<b>c</b>	11	[1]
	<b>d</b>	0	[1]
	<b>e</b>	10	[1]
	<b>f</b>	100–108°	[1]
	<b>g</b>	34	[1]
	<b>h</b>	6	[1]
	<b>i</b>	No, as there is no H atom joined to an N, O or F atom.	[1]
	<b>j</b>	No, although polar it is not able to hydrogen bond to water.	[1]

- 6    
σ-bonding π-bonding [2]
- 7 a  $\text{CO}_3^{2-}$  [1]  
 b  [1]  
 c delocalization [1]  
 of the  $\pi$  electrons from the double bond over the whole ion [1]  
 bond length between 0.143 nm and 0.122 nm [1]  
 d  $1\frac{1}{3}$  [1]
- 8 B [1]  
 A will have intramolecular hydrogen bonding as the  $-\text{COOH}$  groups are closer [1]  
 therefore will have weaker forces between molecules. [1]  
 B has only intermolecular hydrogen bonding. [1]