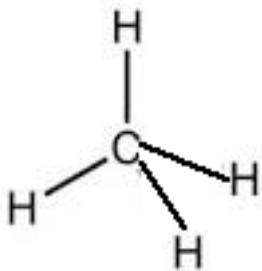
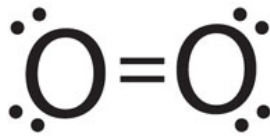
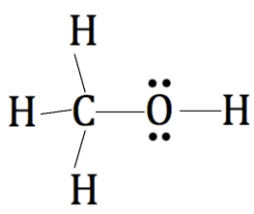
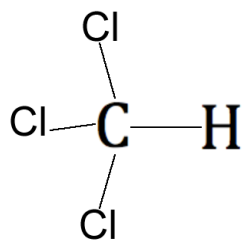
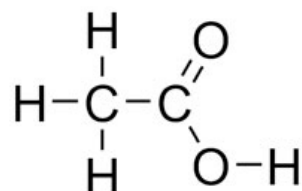


Assignment - Molecules

1) Complete the table below. [Click](#) for a revision on how to draw molecular formulae of molecules.


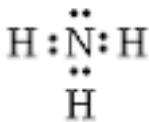

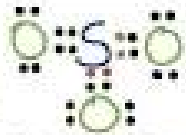
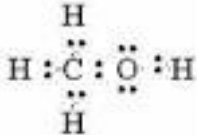
Molecule	Draw the structural formula	Intra-molecular bonding (circle)	Intermolecular bonding (circle)	Symmetry (circle)
CH ₄		Pure covalent <u>Polar covalent</u>	<u>Dispersion forces</u> Dipole-dipole H-bonding	<u>Symmetrical</u> Asymmetrical
O ₂		<u>Pure covalent</u> Polar covalent	<u>Dispersion forces</u> Dipole-dipole H-bonding	<u>Symmetrical</u> Asymmetrical
CH ₄ O		Pure covalent <u>Polar covalent</u>	<u>Dispersion forces</u> Dipole-dipole <u>H-bonding</u>	Symmetrical <u>Asymmetrical</u>
CCl ₃ H		Pure covalent <u>Polar covalent</u>	<u>Dispersion forces</u> <u>Dipole-dipole</u> H-bonding	Symmetrical <u>Asymmetrical</u>
CH ₂ O ₂		Pure covalent <u>Polar covalent</u>	<u>Dispersion forces</u> Dipole-dipole <u>H-bonding</u>	Symmetrical <u>Asymmetrical</u>

NF ₃		Pure covalent Polar covalent	Dispersion forces Dipole-dipole H-bonding	Symmetrical Asymmetrical
H ₂ O		Pure covalent Polar covalent	Dispersion forces Dipole-dipole H-bonding	Symmetrical Asymmetrical

2) Build the molecules shown in the table below using the kits provided and complete the table.



Molecule	Draw the electron dot diagram and give its shape	Symmetry	melting temperature. °C
SO ₂	 V-shape	Symmetrical Asymmetrical	16.9
CCl ₄	 tetrahedral	Symmetrical Asymmetrical	-23
CH ₄		Symmetrical Asymmetrical	-182

	tetrahedral		
OF ₂	 v-shape	Symmetrical Asymmetrical	-223
NH ₃	 Triangular pyramid	Symmetrical Asymmetrical	-78
CO ₂	 linear	Symmetrical Asymmetrical	-79
SO ₃	 Triangular planar	Symmetrical Asymmetrical	-72
CH ₃ OH	 tetrahedral	Symmetrical Asymmetrical	-98

4) Usually, the bigger the molecule the higher its melting temperature.

Offer an explanation as to why the melting temperature of

i. SO₃ is lower than the smaller molecule SO₂

SO₃ is a symmetrical molecule and hence has only weak dispersion forces acting between the molecules. SO₂ is an asymmetrical molecule and so has dipole-dipole bonding as well as dispersion forces.

ii. CO₂ is lower than SO₃

Both CO₂ and SO₃ are both symmetrical molecules and hence have only dispersion forces acting as intermolecular bonding. The bigger the molecule the greater the dispersion forces acting, hence SO₃ will have stronger dispersion forces than CO₂

iii. NH₃ is higher than the much heavier molecule OF₂

NH₃ has H-bonding as well as dispersion forces while OF₂ has dispersion forces and dipole-dipole bonding. H-bonding is a stronger intermolecular force than normal dipole-dipole bonding.

iv. The melting temperature of H₂S is -82°C while the melting temperature of water is 0°C. Explain why since the relative size of water is smaller than H₂S.

The intermolecular forces acting between H₂O molecules have H-bonding and dispersion forces while H₂S has only the weaker dipole-dipole and dispersion forces