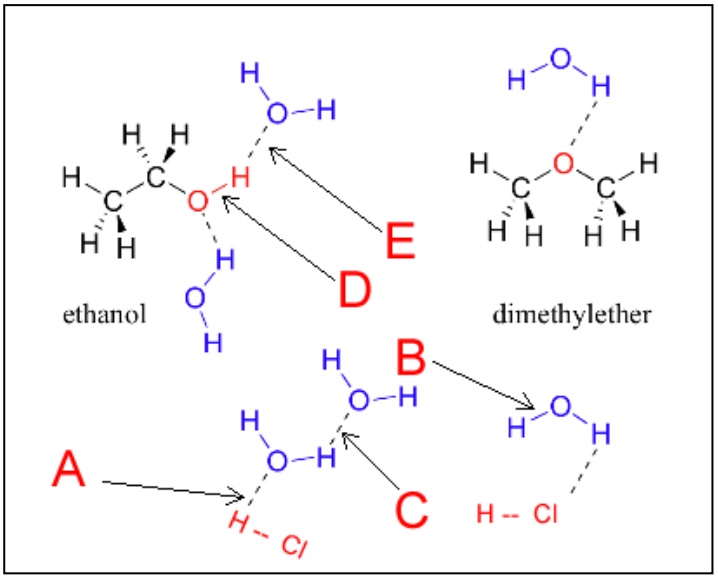
Revision Unit 1

1) Consider the image on the right. It shows three molecules, hydrochloric acid, ethanol and dimethyl ether interacting with water molecules.
Identify the following.
   i. Hydrogen bond C and E
   ii. Dipole-dipole bond A
   iii. Polar covalent bond. D and B



2) On the right is a section of a protein. Identify the type of bonding depicted by:

A____dispersion____

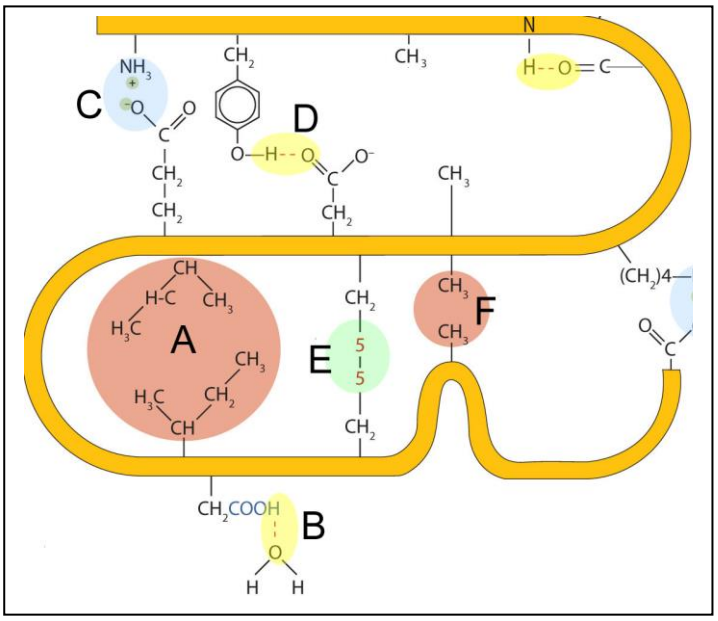
B____hydrogen bonding_____

C_____ionic bonding_____

D_____hydrogen bonding_____

E_____covalent bonding_____

F_____dispersion____



3) Below are the neutral atoms of five different elements with their electronic configurations.

A	B	C	D	E
$1s^2 2s^2 2p^4$	$1s^2 2s^2 2p^6 3s^2 3p^4$	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$	$1s^2 2s^2 2p^6 3s^2 3p^5 4s^1$	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^2 4s^1$

a) Which is the electronic configuration of an excited atom? D It has a partially filled 3p subshell while having an electron in the 4s subshell

b) What two elements will combine to form a brittle solid that melts at temperatures above 800 ^{o}C? Give the formula of the compound.

These are the properties of an ionic substance. Hence a reaction between a metal and a non-metal will produce this substance. Any of either A or B reacting with either C and E. Possible formulae include.(always put the positive ion first) C_2A, E_2A_3, C_2B, E_2B_3

c) What elements are most likely to conduct electricity in the solid state?

C and E because they are metals.

d) What two elements will combine to form a molecular substance?

A and B (AB)

e) What two elements are found in group 1 of the periodic table?

C and E

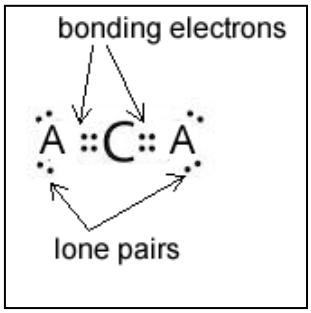
f) What element has similar properties to "A"?

B Both A and B belong to the same group of the periodic table and so share similar chemical properties.

g) Which neutral atom is inert? D

h)) Draw a Lewis dot diagram of the substance formed between element A and carbon. In your diagram label the lone pairs, bonding pairs and give the shape of the molecule.

It is a linear molecule.

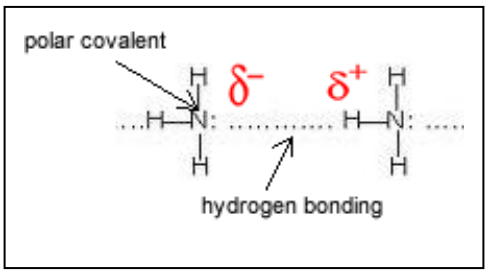


4) Below is a table of elements and their electronegativity values.

Element	Electronegativity
Carbon	2.5
Nitrogen	3.0
hydrogen	2.1
Oxygen	3.5
Fluorine	4.0
Chlorine	3.0
δ^+	δ^-

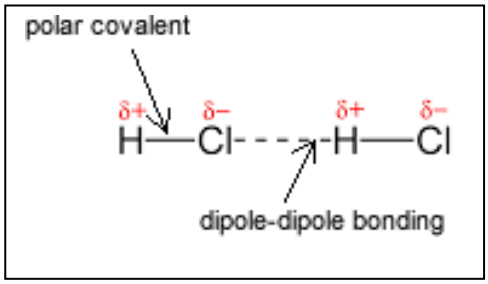
a) Using the symbols shown above draw the orientation of

i. two molecules of NH_3. Identify the intra and inter molecular bonding



Intra molecular bonding is polar covalent.
Intermolecular bonding is dispersion forces + hydrogen bonding

ii. two molecules of HCl. Identify the intra and inter molecular bonding



Intra molecular bonding is polar covalent.
Intermolecular bonding is dispersion forces + dipole-dipole bonding

b) Explain why HF, being a smaller molecule than HCl, has a boiling temperature of 19.5 °C, while HCl boils at -85.05 °C .

The difference in electronegativity between hydrogen and fluorine is 1.9 (4.0 - 2.1). The dipoles present on the H-F molecule are bigger than those on the H-Cl molecule which has a difference in electronegativity between the hydrogen and the chlorine of only 0.9 (3.0 – 2.1). The larger dipoles on the H-F cause a much stronger attraction between the molecules known as hydrogen bonding.

c) Describe the intermolecular and intramolecular bonding that exists in liquid O_2

Intra molecular bonding is pure covalent.
Intermolecular bonding is dispersion forces only