

Unit 1 Bonding in Compounds



Go to question:

- 1  Which element has the least attraction for bonding electrons?
- 2  The shape of some common molecules are shown below and each one contains at least one polar bond. Which one of these molecules is non-polar?
- 3  In which molecule will the bromine atom carry a partial positive charge, (δ^+)?
- 4  Silicon carbide is a solid at room temperature, this is because?
- 5  What types of bonding are found in ethanol?
- 6  Which of these fluorides is likely to be the most covalent in character?
- 7  A compound melts at 321°C , does not dissolve in water and does not conduct electricity when molten. Which type of bonding is present within the compound ?
- 8  Elements W, X, Y and Z all form iodides.....
Which bromide is the most likely to dissolve in the solvent $\text{CCl}_2=\text{CCl}_2$



1 Which element has the least attraction for bonding electrons?

a Rubidium

b Sulphur

c Chlorine

d Carbon



a hint!!!!

1st hint

Non-metal elements are electron acceptors



2nd hint

Electronegativity is the measure of how well an atom attracts a bonding pair of electrons.



3rd hint

Look at page 10 of your data book.



Which element has the least attraction for bonding electrons?

Correct because.....

Electronegativity is a numerical measure of the relative ability of an atom in a molecule to attract the bonding electrons towards itself.

Electronegativity

Rb = 0.8 least likely to attract a pair of bonding electrons.

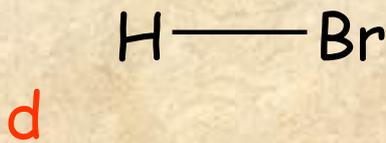
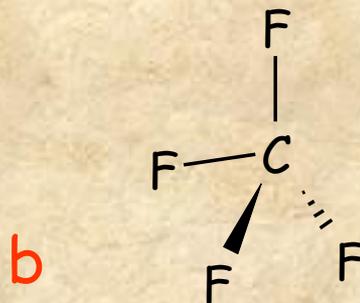
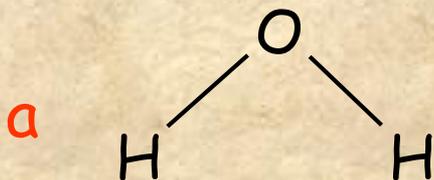
S = 2.5

Cl = 3.0

C = 2.5



2 The shape of some common molecules are shown below and each one contains at least one polar bond. Which one of these molecules is non-polar?



a hint!!!!

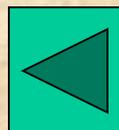
1st hint

Consider the electronegativities of the various atoms



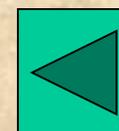
2nd hint

Consider where the dipoles are.



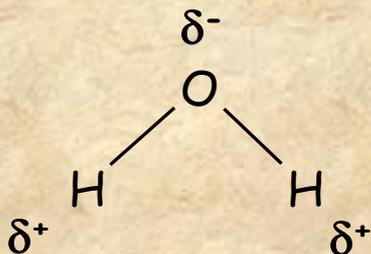
3rd hint

Consider the symmetrical nature of each molecule.



The shape of some common molecules are shown below and each one contains at least one polar bond. Which one of these molecules is non-polar?

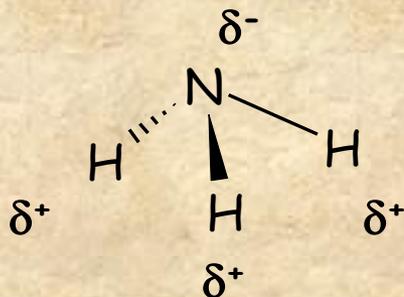
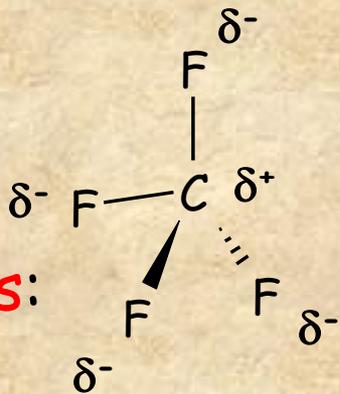
Correct because.....



Symmetry of molecules

If a molecule with polar covalent bonds has these in a symmetrical shape, the molecule will not have a permanent dipole so will not be polar. CF_4 has such a shape and so is not polar.

Ans:



3 In which molecule will the bromine atom carry a partial positive charge, (δ^+)?



a hint!!!!

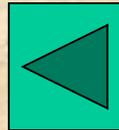
1st hint

Consider the electronegativities of the various atoms



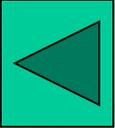
2nd hint

Which atom will become δ^- ?



a hint!!!!

Only temporary dipoles will be formed on the Br₂ molecules



In which molecule will the bromine atom carry a partial positive charge, (δ^+)?

Correct because.....

Electronegativities

Cl = 3.0

Br = 2.8

I = 2.6

H = 2.2

The atom with the greater electronegativity will attract the bonding pair of electrons. In doing so will acquire a δ^- charge. The other atom will then acquire a δ^+ charge.



4 Silicon carbide is a solid at room temperature, this is because?

- a It has a similar structure to aluminium carbide.
- b Van der Waals' forces are important to its structure.
- c It has carbon double bonds in its structure.
- d It has a covalent network structure.



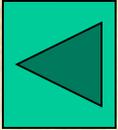
a hint!!!!

Aluminium carbide has intermediate ionic/covalent bonding



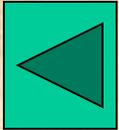
a hint!!!!

Consider the strength of Van der Waals' forces?



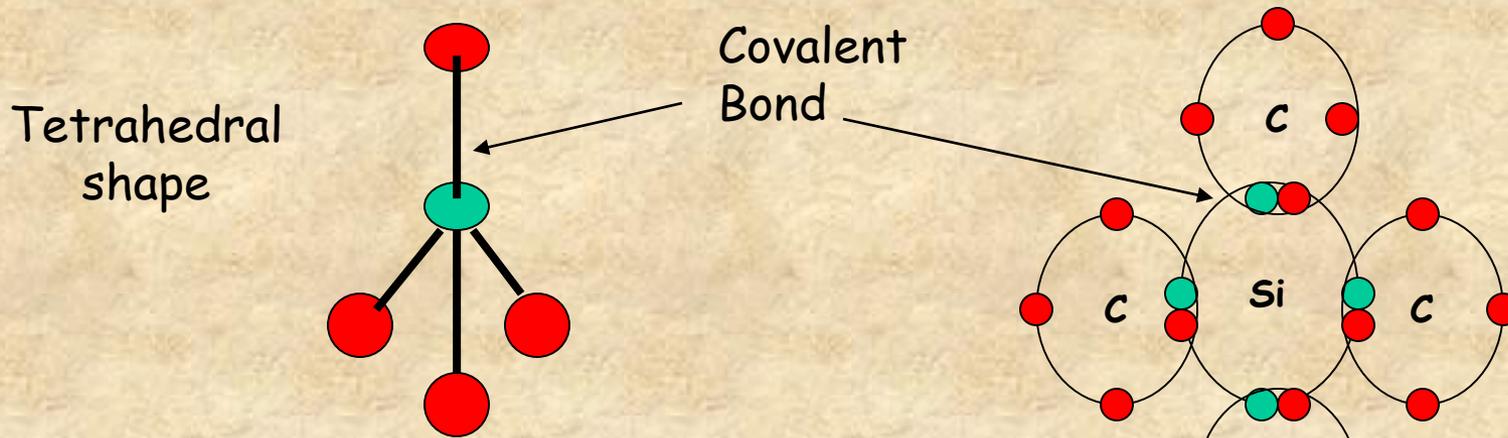
a hint!!!!

Silicon carbide's formula is SiC , with C bonding to Si .



Silicon carbide is a solid at room temperature, this is because?

Correct because.....



The 4 carbon atoms are available to bond with another 4 silicon atoms.

This results in a **COVALENT NETWORK COMPOUND**

Many covalent bonds need to be broken before the compound will melt.



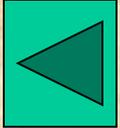
5 What types of bonding are found in ethanol?

- a Covalent, polar and hydrogen bonding
- b Covalent and hydrogen bonding
- c Covalent bonding and Van der Waals' attractions
- d Covalent, Van der Waals' and hydrogen bonding



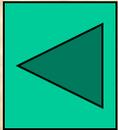
a hint!!!!

Ethanol has polar-polar bonding, but of a special type!!



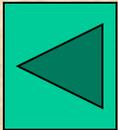
a hint!!!!

Ethanol is a molecule which, like all molecules, can form temporary dipoles.



a hint!!!!

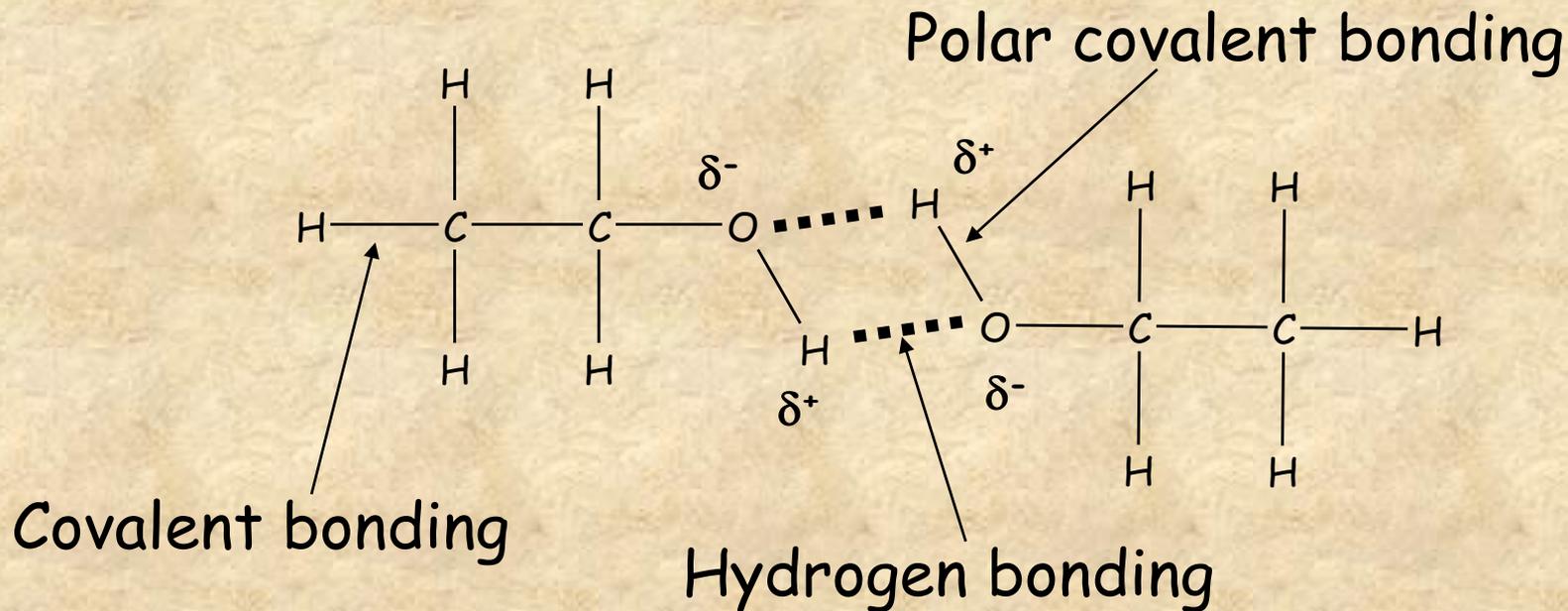
Ethanol has O-H bonding, which forms a special type of polar-polar bond. This results in a particular strong type of intermolecular bonding.



What type of bonding is found in ethanol?

Correct because....

Ethanol contains three types of bonding



And as with all molecules, van der Waals' forces exist between molecules.



6 Which of these fluorides is likely to be the most covalent in character?

a NaF

b MgF_2

c LiF

d CaF_2



a hint!!!!

1st hint

Consider the electronegativities of the various atoms



2nd hint

The difference in the electronegativities indicate the degree of ionic or covalent character.



3rd hint

The bigger the difference, the more ionic in character.



Which of these fluorides is likely to be the most covalent in character?

Correct because....

Electronegativities

Na = 0.9

Li = 1.0

Mg = 1.2

Ca = 1.0

F = 4.0

The greater the difference in electro-negativities the more ionic in nature the bond will be.



Increasing covalent character



7 A compound melts at 321°C , does not dissolve in water and does not conduct electricity when molten. Which type of bonding is present within the compound ?

- a Covalent (non-polar)
- b Ionic
- c Covalent (polar)
- d Metallic



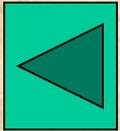
a hint!!!!

Ionic compounds contain ions and therefore have ionic bonding.



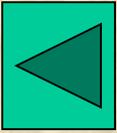
a hint!!!!

What properties do all metals have?



a hint!!!!

Covalent compounds which are non-polar will only have van der Waals' forces acting as intermolecular forces.



A compound melts at 321°C , does not dissolve in water and does not conduct electricity when molten.

Which type of bonding is present within the compound ?

Correct because.....

Its melting point suggests a covalent compound.

Not conducting when molten means that no ions are present, again suggesting a covalent compound, not ionic or metallic.

Being a solid covalent compound not dissolving in water suggests a covalent substance.

Being polar suggests a compound is a covalent compound.



8 Elements W, X, Y and Z all form iodides. Y has a greater electronegativity than, Z. W has a greater electronegativity than X. Both Y and Z have greater electronegativities than W and X. Which iodide is the most likely to dissolve in the solvent $\text{CCl}_2=\text{CCl}_2$?

- a W Iodide
- b X Iodide
- c Y Iodide
- d Z Iodide



a hint!!!!

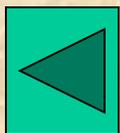
1st hint

Like dissolves like!!!!



2nd hint

Which element is the least likely to form an ionic bond.



3rd hint

Consider the least electronegative atom.



Elements W, X, Y and Z all form iodides. Y has a greater electronegativity than Z. W has a greater electronegativity than X. Both Y and Z have greater electro-negativities than W and X. Which iodide is the most likely to dissolve in the solvent $\text{CCl}_2=\text{CCl}_2$?

Correct because.....

X iodide

These have the closest electronegativities and so are more likely to be a covalent compound. X has the lowest electronegativity which dissolves in a non-polar solvent.

