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CHEMISTRY

MULTIPLE CHOICE - 6

CHEMICAL BONDING

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CHEMICAL BONDING - 6

1) Helping concepts

An example of a compound with a giant covalent structure is SiO_2 which is formed by silicon in Group IV and oxygen in Group VI. Since Q is in Group IV and R is in Group VI, the answer is P is from Group II and forms ionic compounds with Q, R or S. S is from Group V only forms one bond with Q or R. Hence, S cannot form covalent compounds with giant covalent structure.

2) Helping concepts

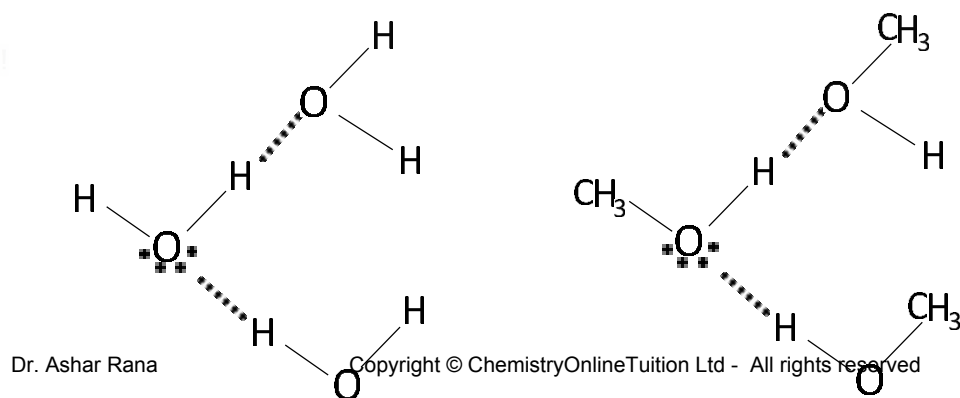
Both R and S are ionic compounds since they have high melting point and boiling point. They conduct electricity in liquid state (not in solid state). However, since S has a higher melting point and boiling point, S has a stronger ionic bond. i.e. (B), (C) and (D) (higher ionic charges and smaller ionic radii).

3) Helping concept

When hydrogen bonds are formed initially, heat is released (exothermic) and temperature rises. When more water is added, hydrogen bonds are broken and this requires energy (endothermic) and temperature drops.

4) Helping concept

In both H_2O and CH_3OH , there exist O – H bonds in the molecules. hence, intermolecular H – bonds are present.



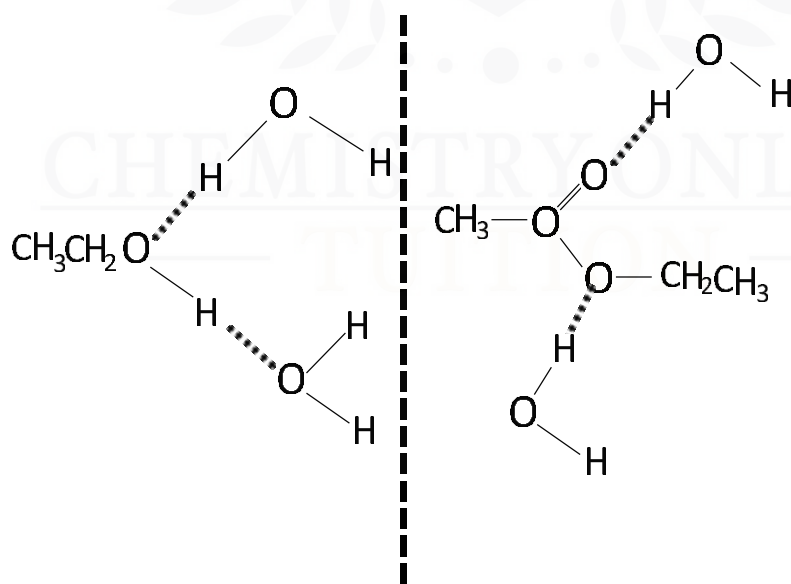
In $\text{CH}_3 - \text{O} - \text{CH}_3$, the molecule is polar (non-linear molecule) due to the polar $\text{C} - \text{O}$ bonds. Hence, permanent dipoles interactions are present.

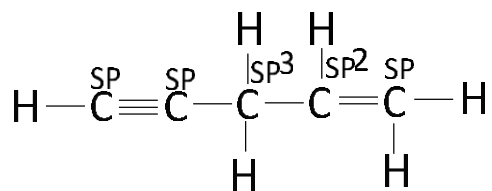
5) Helping Concepts

Carbon is in Group IV and has 4 valence electrons. All the 4 electrons are used for bonding. Hence, the arrangement is tetrahedral with bond angles $= 109.5^\circ$. Oxygen is in Group VI and has 6 valence electrons. However, only 2 electrons are used for bonding (2 σ bonds, having behind 2 lone pairs of electrons). The electronic arrangement around oxygen is also tetrahedral. The presence of the 2 lone pairs of electron causes the 2 $\text{C} - \text{O}$ bonds to be closer to each other since they exert greater repulsion. Hence, the bond angle is less than 109.5° .

6) Helping Concept

The H of H_2O is able to form H-bonds with the O of $-\text{OH}$ and the O of $-\overset{\text{O}}{\parallel}\text{C}-\text{O}-$ respectively. However only the H of $-\text{OH}$ is able to form H-bonds with O of H_2O and ethyl ethanoate is unable to do so. In fact, the ester does not mix well with H_2O due to its long C chain,



7) **Helping Concept**

There is no $sp - sp^2$ orbitals to form a σ bond.

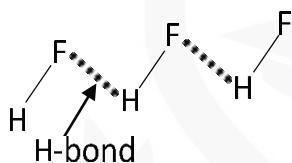
The σ bonds present are

$CsP - H$ is, $Csp^3 - H$ is, $Csp^2 - H$ is

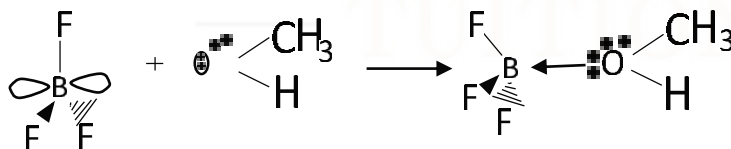
$Csp - Csp$, $Csp - Csp^3$, $Csp^3 - Csp^2$, $Csp^2 - Csp^2$

8) **Helping Concept**

F is small and highly electronegative. In HF, H – bonds exist between HF molecules.

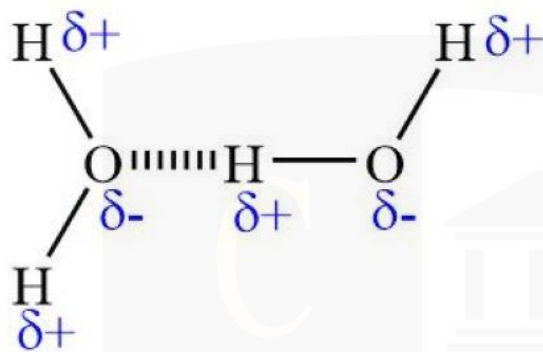
9) **Helping Concept**

In a BF_3 molecule, there are 3 B – F covalent bonds arranged in a trigonal planar manner with a vacant orbital perpendicular to the plane. The oxygen of CH_3OH uses a lone pair of electrons to form a dative bond with B.



10) Helping Concept

There are more extensive H – bonding between the H_2O molecules.



Each H_2O molecule can form 2 H bonds through the H atoms and 2 H – bonds through the 2 l.p. of O. In HF, there is only 1 H – bonds through the H and 1 H – bond through a l.p of F.

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I am Sorry !!!!!



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- Founder & CEO of Chemistry Online Tuition Ltd.
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