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CHEMISTRY

MULTIPLE CHOICE - 8

CHEMICAL BONDING

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CHEMICAL BONDING - 8

1) Helping concepts

***1** C_2H_5OH is a polar molecule as it contains a polar O – H bond.

2. NaCI is ionic and does not exist as molecules.

3. SiO_2 is giant molecular.

2) Helping concepts

***1.** *Weak van der Waals' forces exist between each layer of C atoms. The layers can therefore slide over one another without shattering the lattice. This makes graphite a good lubricant.*

***2.** *Within each layer, each C atom is* sp^2 *hybridised and it bonds with* 3 *other C atoms in a trigonal planar manner, forming hexagonal rings. Each C atom is left with a Ione electron and these elecrons form a mobile electron which contributes to the electrical conductivity in the direcxtion parallel to the planes. Electrons are ubable to move from one plane to another and hence, graphite is ubable to conduct electricity perpendicular to these planes.*

***3** *The van der Waals' forces between each plane is weaker than the covalent bonds within each layer .*

3) Helping concept

There are strong Si − Cl bonds in the molecule and weak VDW forces between the molecules.

4) Helping concept

The properties of BN should be similar to that of graphite since they share similar structure. Hence, BN should be slippery, non − trasparent and can be used as a lubricent.

5) Helping Concepts

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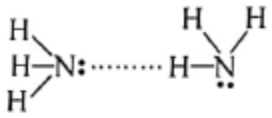
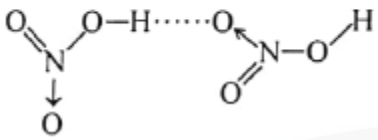
1. The N is NH_4^+ does not contain Ione electron pair for hydrogen bonding.

*2. 

*3. 

6) Helping Concept

The Na^+Cl^- lattic consists of two interlocking faceentred such cubic lattices of NA^- and Cl^-. Each Na^+ is surrounded octahedrally by six Cl^-, and vice versa. The interionic distnace is given by the sum fo the ionic radii of Na^+ and Cl^-

7) Helping Concept

***1** All the 3 molecules have 4 region of elecron clouds and hence they are directed tetrahedrally. However, there are 2 Ione pair, 1 Ione pair and no Ione pair of elecrons in H_2O, NH_3 and CH_4 respectively. As $1.p. - 1.p.. > 1.p - b.p. > b.p. - b.p.$ repulsion , H_2O would have teh smallest bond angle while CH_4 has the largest bond angle.

2. $H_2O(-109.5^0, V-$ shaped), SF_6 (90^0, octahedral), $BF_3(120^0$, trigonal plannar).

3. $CH_4(109.5^0$, tetrahedral), CO_2 (180^0linear), SF_6 (90^0 tetrahedral).

8) Helping Concept

***1.** In diamond, each C atom is tetrahedrally bonded to 4 other C atoms. Bond angle $= 109.5^0$. In graphite, each C atom is bonded to 3 other C atoms in a trigonal planar mmanner. Bond angle $= 120^0$.

2. In diamond, each $C-C$ is a normal σ `bond. In graphite, there is a sea of delocalides electrons along each plane. There is partial double bond character in the $C-C$ bond length is shorter in graphite.

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3. Which $C-C$ bonds in graphite have the same bond length.

9) Helping Concept

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1. When $AlCl_3$ dissolves in benzene, it exists, it exists as Al_2Cl_6 molecules. The solution *obtained does not conduct electricity since there is no mobile ion.*

*2 $AlCl_3$ undergoes hydrolysis with the moisture in the air to give HCl fumes.

$AlCl_3\ (s) + H_2O\ (l) \rightleftharpoons Al(OH)Cl_2(s) + HCl(g)$

*3. *In the vapour phase,* $AlCl_3$ *exists as simple* Al_2Cl_6 *molecules at temperature below* 183 ^{0}C. *Above this temperature, the dimer begins to dissociate to give* $AlCl_3$ monomeric molecules.

10) Helping Concept

Metallic bonding is present in both Group 1 and Group II metals. *The strength of the metallic bond depends on the number of electrons per atom aailable for delocalisation and the* Interatomic distance between the atoms. The more the electrons available and shorter *the interatomic distance, the stronger the metallic bond.*

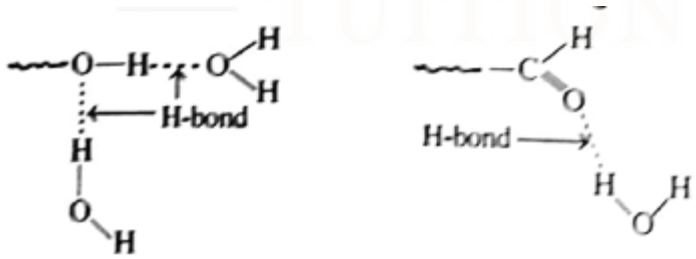
*1 Atoms of Group of II are smaller than those of Group 1 in the same period. Atomic size decreases across a period.

*2. Atoms of Group II metals have 2 velence electrons available for bonding whereas those of Group 1 have only 1.

*3 This statement is correct but does not explain phenonmenon.

11) Helping Concept

Hydrogen bonds can be formed either between the O of H_2O *and the H of the* $-OH$ *of glucose, or between the H of* H_2O *and the electronegative O of glucose.*



12) Helping Concept

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*1,*2. *Dative covalent bonds are formed between Mg adn two of the N atoms (shown by ... ... line). The other two N atoms form σ bonds with Mg atom (shown by ___line).*

3. *Since the structure is planar around Mg, the N atoms are sp^2 hybridised.*

13) Helping Concept

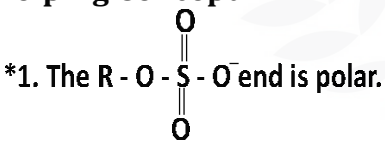
A liqid that floats on H_2O is less dense than H_2O. The converse, however, is not necessarily true. A liquid that is less dense than H_2O may not necessarily float on H_2O. Instead, it may mix with H_2O.

*1. The van der Waals' interactions are different from the H − bonding in H_2O. Therefore, the 2 liquid do not mix. Furthermore, VDW forces are weak and therefore, the hydrogacrbon molecules are further apart. It has a lower density.

*2 *The statement implies that H_2O is more dense. Since the 2 types of interactions are different, the 2 liquids do not mix.*

*3 *The statement explains why the 2 liquids do not mix.*

14) Helping Concept



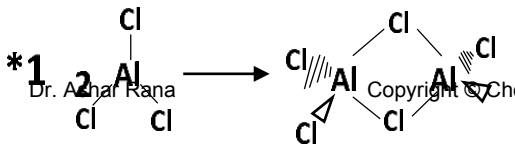
*2. *The alkyl chain is hydrophobic and hence is soluble in all dropies.*

*3 *The C − C − C − bond angles are tetrahedral since it is saturanced (I.e. no C = double* Bonds or C=C triple bonds).

15) Helping Concept

The Group VI elements are generally more electronegative than Group IV elements. The order of polarity of the double bonds is C = O > C = S > C = Se. since the order of electronegativity is O > S > Se.

16) Helping Concept



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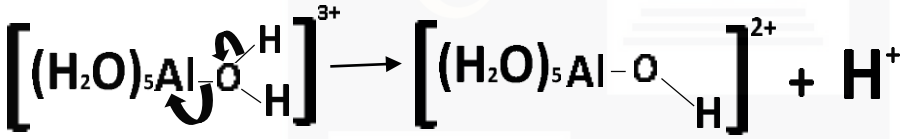
$AlCl_3$ *dimerises readily to give* Al_2Cl_6 *So that Al, which has a sextet configuration, gains stability by acquiring an octet configuration.*

2,3, *Its covalent character and acidity in aqueous solution are due to its high polarising power. i.e. high charge* $(+3)$ *and small size. The ionic bond, if formed, is greatly polarised and covalency results. Its acidity is due to the successive elimination of protons from the* H_2O *ligands.*



17) Helping Concept

1. *If it were true, then one would expect an increase in bond angle instead.*

*2*3. *According to VSEPR, the repulsion between electron pairs decreases in the order.*

Ione pair − Ione pair > Ione pair − bond pair

H_2O *with the greatest number of Ione electron pairs have the smallest bond angle.*

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