

## Topic : Chemical Bonding

## Type of Questions

Single choice Objective ('-1' negative marking) Q.1 to Q.7

(3 marks, 3 min.)

M.M., Min.

[21, 21]

Multiple choice objective ('-1' negative marking) Q.8

(4 marks, 4 min.)

[4, 4]

- Hydrogen forms bridge in the chemical structure of :  
 (A) Hydrogen peroxide (B) Lithium hydride (C) Diborane (D) Sodium peroxide
- In  $B_2H_6$  :  
 (A) There is a direct boron-boron bond.  
 (B) The structure is similar to that of  $C_2H_6$ .  
 (C) The boron atoms are linked through hydrogen bridges.  
 (D) All the atoms are in one plane.
- The hybridization of central atom and shape of  $(SiH_3)NCO$  is :  
 (A)  $sp^2$ , planar (B)  $sp^3$ , tetrahedral (C)  $sp^3$ , pyramidal (D)  $sp$ , linear
- The main factor responsible for weak Lewis acid nature of  $BF_3$  among all boron trihalides is :  
 (A) Large electronegativity of F (B) Three centred-two electron bonds in  $BF_3$   
 (C)  $p\pi-d\pi$  back bonding (D)  $p\pi-p\pi$  back bonding
- Which is not true about  $B_2H_6$   
 (A) Both 'B' atoms are  $sp^3$  hybridised (B) Boron atom is in ground state  
 (C) Two hydrogens occupy special positions (D) There are two, three centre two electron bonds
- Statement-1** : Geometry of  $(CH_3)_3N$  is pyramidal but in case of  $(SiH_3)_3N$ , it is planar.  
**Statement-2** : Silicon is less electronegative than Carbon.  
 (A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.  
 (B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1  
 (C) Statement-1 is True, Statement-2 is False  
 (D) Statement-1 is False, Statement-2 is True
- Statement-1** : Calculated bond length of B-F bond in  $BF_3$  is 152 pm, whereas observed bond length is 130 pm.  
**Statement-2** : B-F bond in boron trifluoride possesses partial double bond character due to  $p\pi-p\pi$  back bonding.  
 (A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.  
 (B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1  
 (C) Statement-1 is True, Statement-2 is False  
 (D) Statement-1 is False, Statement-2 is True
- \*  $BCl_3$  does not exist as dimer but  $BH_3$  exist as dimer ( $B_2H_6$ ) because:  
 (A) Chlorine is more electronegative than hydrogen  
 (B) There is  $p\pi-p\pi$  back bonding in  $BCl_3$  but  $BH_3$  does not contain such bonding  
 (C) Large sized chlorine atoms do not fit between the small boron atoms whereas small sized hydrogen atoms get fitted between boron atoms  
 (D) None of these



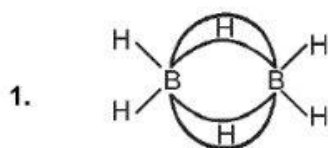
# Answer Key

## DPP No. # 16

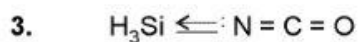
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|----|-----|----|-----|-----|------|----|-----|----|-----|
| 1. | (C) | 2. | (C) | 3.  | (D)  | 4. | (D) | 5. | (B) |
| 6. | (B) | 7. | (A) | 8.* | (BC) |    |     |    |     |

## Hints & Solutions

### DPP No. # 16



Diborane



6. In  $(\text{CH}_3)_3\ddot{\text{N}}$ , N is  $\text{sp}^3$  hybridized, having pyramidal structure because of absence of vacant orbital on carbon atom therefore no back bonding is possible.  
In  $(\text{SiH}_3)_3\text{N}$ , N is  $\text{sp}^2$  hybridized, on the basis of  $\text{p}\pi\text{-d}\pi$  back bonding  $(\text{SiH}_3)_3\text{N}$  resulting into triangular planar structure.

