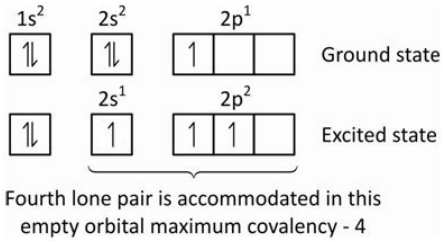
Level - 1	**DTS-1**

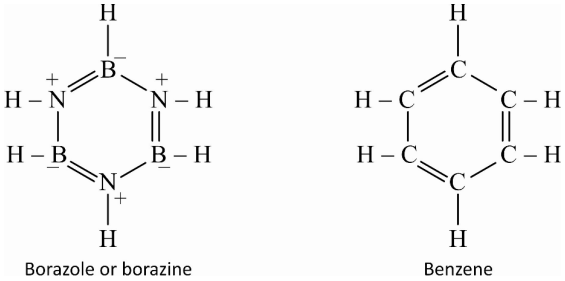
1.(A)



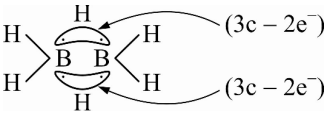
Due to absence of 2d-orbital, maximum covalency is four. Thus BF_6^{3-} is not formed. Thus (A) is not formed. $BH_4^-(BH_3 + H^-)$; $B(OH)_4^-$ and BO_2^- are formed.

2.(D) The enthalpy of formation of Al_2O_3 is very high and hence, it is not possible to reduce it by carbon.

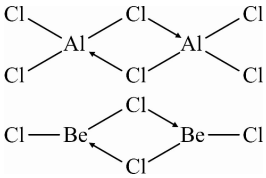
3.(C) Borazine, $B_3N_3H_6$ is also known as inorganic benzene due to its resemblance in structure and properties with benzene.



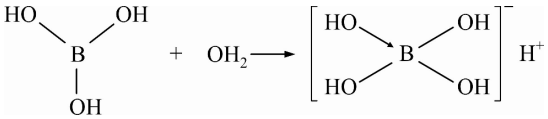
4.(C)



5.(C) Chlorides of both beryllium and aluminium have bridged structures in solid phase.



Boric acid is not a protonic acid



6.(C) According to Lewis theory, the compounds which can accept a lone pair of electrons are called acids. Boron halides, being electron deficient compounds, can accept a lone pair of electrons, so termed as Lewis acid.

7.(C) The outer electronic structure of X is s^2p^1. Hence, element X belongs to the 13^{th} group. It will be a non-metal because it is present in the first short period of 13^{th} group. Its valency is +3. Hence, formula of its oxide will be X_2O_3. The oxide will be acidic in nature because it is oxide of non-metal.

8.(D) B_2H_6 has structure

9.(B) $BCl_3 + 3H_2O \longrightarrow B(OH)_3 + 3HCl$

Thus, the products are $B(OH)_3$ or H_3BO_3 and HCl.

10.(B) $AlCl_3$ is covalent but in water, it becomes ionic due to large hydration energy of Al^{3+}.

$AlCl_3 + 6H_2O \rightleftharpoons [Al(H_2O)_6]^{3+} + 3Cl^-$

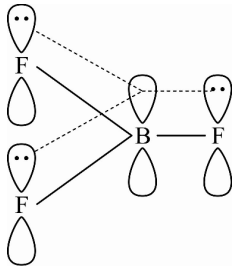
11.(B) Al_4C_3 is Methanide as on hydrolysis, it gives CH_4. $Al_4C_3 + H_2O \longrightarrow Al(OH)_3 + CH_4$

12.(A) Boric acid is used in carom boards for smooth gliding of pawns because H-bonding in H_3BO_3 gives it a layered structure.

13.(B) Aqueous solution of $AlCl_3$ is acidic due to hydrolysis. $AlCl_3 + 3H_2O \rightleftharpoons Al(OH)_3 + 3HCl$;

On strongly heating $Al(OH)_3$ is converted into Al_2O_3. $2Al(OH)_3 \xrightarrow{\Delta} Al_2O_3 + 3H_2O$

14.(A) Boron trihalides are Lewis acid. The order of their acidic strength is as $BF_3 < BCl_3 < BBr_3 < BI_3$



In the boron halides, a $p\pi - p\pi$ back bonding arises due to empty orbital of boron and filled orbitals of halogens.

This $p\pi - p\pi$ back bonding has maximum effect in BF_3 as the size of B and F-atoms are comparative and this effect decreases as the size of halogen increases.

Due to this effect, tendency of accepting lone pairs of electron of boron decreases i.e., Lewis acidic character decreases.

15.(B) In diborane, H – B – H (H-terminal) and H – B – H (H-bridged) bond angles are 120° and 97° respectively.