



# CHEMISTRY

## BOOKS - CBSE COMPLEMENTARY MATERIAL CHEMISTRY (HINGLISH)

### P-BLOCK ELEMENTS

#### Multiple Choice Question

1. The element which exists in liquid state for a wide range of temperature and can be used

for measuring high temperature is

A. B

B. Al

C. Ca

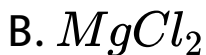
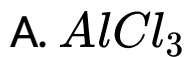
D. Ga

**Answer: D**



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2. Which of the following is a Lewis acid ?



**Answer:**



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**3.** The geometry of a complex species can be understood from the knowledge of type of hybridisation of orbitals of central atom. The

hybridisation of orbitals of central atom in  $[B(OH_4)]^-$  and the geometry of the complex are respectively.

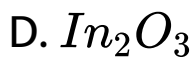
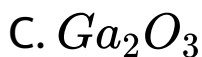
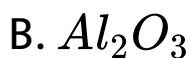
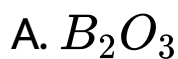
- A.  $sp^3$ , tetrahedral
- B.  $sp^3$  square planar
- C.  $sp^3d^2$  octahedral
- D.  $dsp^2$ , square planar

**Answer:**



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4. Which of the following oxide is acidic in nature ?



**Answer:**



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5. The exhibition of highest co-ordination number depends on the availability of vacant orbitals in the central atom. Which of the following elements is not likely to act as central atom in  $MF_6^{3-}$  ?

A. B

B. Al

C. Ga

D. In

**Answer:**



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6. Boric acid is an acid because its molecule

A. Contains replaceable  $H^+$  ion

B. Gives up a proton

C. Accept  $OH^-$  from water releasing  
proton

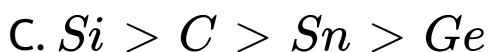
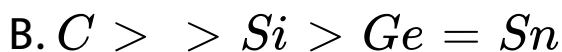
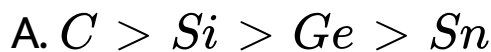
D. Combines with proton from water  
molecule

**Answer:**

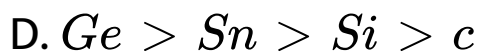


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7. Catenation i.e., linking of similar atoms depends on size and electronic configuration of atoms. The tendency of catenation in group 14 elements follows the order.





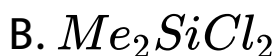


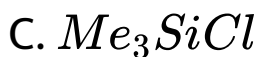
**Answer:**



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8. Silicon has a strong tendency to form polymers like silicones. The chain length of silicone polymer can be controlled by adding





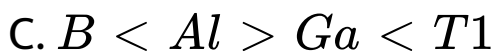
**Answer:**



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9. Ionisation enthalpy ( $\Delta_i H \text{ kJ mol}^{-1}$ ) for the elements of group 13 follows the order.



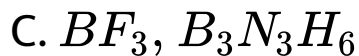
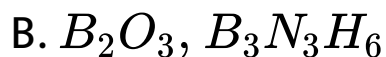
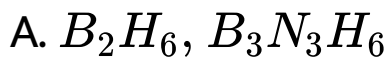


**Answer:**



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**10.** A compound X, of boron reacts with  $NH_3$  on heating to give another compound Y which is called inorganic benzene. The compound X can be prepared by treating and Y are represented by the formula.



**Answer:**



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**11.** Quartz is extensively used as a piezoelectric material, it contains .....

A. Pb

B. Si

C. Ti

D. Sn

**Answer:**



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**12.** The most commonly used reducing agent is

A.  $AlCl_3$

B.  $PbCl_2$

C.  $SnCl_4$

D.  $SnCl_2$

**Answer:**



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**13.** Dry ice is

A. Solid  $NH_3$

B. Solid  $SO_2$

C. Solid  $CO_2$

D. Solid  $N_2$

**Answer:**



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**14.** Cement, the important building material is a mixture of oxides of several elements. Besides calcium, iron and sulphur, oxides of elements of which of the group (s) are present in the mixture ?

A. Group 2

B. Groups 2, 13 and 14

C. Groups 2 and 13

D. Groups 2 and 14

**Answer:**



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**Assertion Reason Type Question**



1. Assertion (A): If aluminium atoms replace a few silicon atoms in three dimensional network of silicon dioxide, the overall structure acquires a negative charge.

Reason(R): Aluminium is trivalent while silicon is tetravalent.

A. Both A and R are correct and R is the correct explanation of A.

B. Both A and R are correct but R is not the correct explanation of A.

C. Both A and R are not correct

D. A is not correct but R is correct.

**Answer:**



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2. Assertion (A) : Silicons are water repelling in nature.

Reason (R ) : Silicons are organosilicon polymers, which have  $( - R_2SiO - )$  as repeating unit.

A. A and R both are correct and R is the correct explanation of A.

B. Both A and R are correct but R is not the correct explanation of A.

C. A and R both are not true.

D. A is not true but R is true.

**Answer:**



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## 1 Mark Question

1. Mention two important ores of boron.



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2. Name the element of group 13 which forms only covalent compounds.



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3. Why the atomic radius of gallium is less than that of Al?



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4. Why boron forms electron deficient compounds?



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5. Why boron does not exist as  $B^{3+}$  ion in solution or in compound ?



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6. Why trihalides of group 13 elements fume in moist air?



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7. Aluminium forms  $[AlF_6]^{3-}$  ion but boron does not form  $[BF_6]^{3-}$  ion. Explain.



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8. Why boric acid is a monobasic acid ?



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9. White fumes appear around the bottle of anhydrous aluminium chloride. Give reason.



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10.  $AlCl_3$  exist as dimer while  $BCl_3$  exist as monomer, why?



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11. Hybridisation of Boron in  $B_2H_6$  molecule is

:



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**12.** Write the chemical formula of the following substances: Inorganic benzene



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**13.** Why aluminum utensils should not be kept in water overnight.



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14. Explain what happens when boric acid is heated.



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15.  $BCl_3$  exists but  $BH_3$  does not. Explain.



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16. Why  $SnCl_4$  is more covalent than  $SnCl_2$



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17. Why  $PbCl_4$  is good oxidising agent?



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18. What are germanes and plumbanes?



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19. Give one example of zeolite.



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20. Mention the type of hybridization of carbon in diamond and graphite.



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21. Why  $\text{CCl}_4$  is insoluble in water but  $\text{SiCl}_4$  is soluble in water? Explain.



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22. Give two uses of silicones.



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23. Graphite is used as a lubricant. Explain.



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24. Lead (Pb) do not form  $PbI_4$ . Why?



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25.  $CO_2$  is a gas while  $SiO_2$  is a solid. Explain.



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26. Explain why silicon shows a higher covalency than carbon.



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27. Which out of carbon and silicon forms multiple bonds?



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**28.** What is the chemical formula of Dry Ice?



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**29.** Which is the basic building unit of all silicates?



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30. Why is graphite a good conductor of electricity but diamond is not?



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## 2 Mark Question

1. Draw the structure of diborane.



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2. What happens when: Borax is heated strongly



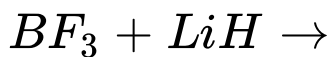
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3. What happens when: Boric acid is added to water,



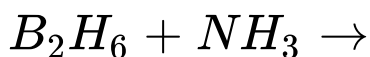
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4. Write balanced equations for:



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5. Write balanced equations for:



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6. Write chemical reactions to show the amphoteric nature of water.



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7. Suggest reasons why the B–F bond lengths in  $BF_3$  (130 pm) and  $BF_4^-$  (143 pm) differ.



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8. Give reason for the following

$BF_3$  act as weak Lewis acid.



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9. Give reason for the following

Boron cannot show covalency more than four.



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**10.** How can you explain higher stability of  $BCl_3$  as compared to  $TiCl_3$ ?



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**11.** Give reasons: Aluminium alloys are used to make aircraft body.



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**12.** Give reasons: Aluminium wire is used to make transmission cables.



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**13.** Describe the shapes of  $BF_3$  and  $BH_4^\ominus$ .  
Assign the hybridisation of boron in these species.



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14. Explain the chemistry of borox bead test.



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15.  $[SiF_6]^{2-}$  is known where as  $[SiCl_6]^{2-}$  not.

Reason is



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16. At room temperature,  $CO_2$  is a gas while

$SiO_2$  is a solid because



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**17.** Why is solid carbon dioxide known as dry ice ?



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**18.** Elemental silicon does not form a graphite like structure. Explain.



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19. Suggest a reason as to why  $CO$  is poisonous.



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20. How is excessive content of  $CO_2$  responsible for global warming?



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21. What is allotropy ? Name two elements which exhibit allotropy.



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22. Write equations for the production of water gas producer gas from coke.



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**23.** Define Zeolite. Name the Zeolite which converts alcohols directly into gasoline.



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**24.** Arrange the hydrides of group 14 elements in increasing order of:

Thermal stability



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25. Arrange the hydrides of group 14 elements

is increasing order of :

Reducing power.



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### 3 Mark Question

1. Give reasons of the following

In diborane, two B - H - B bonds are different from common covalent bonds.



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2. A certain salt X gives the following results:

Its aqueous solution is alkaline to litmus.



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3. A certain salt X gives the following results:

It swells up to a glassy material Y on strong heating.



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4. A certain salt X gives the following results:

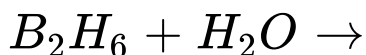
When conc.  $H_2SO_4$  is added to a hot solution of X, white crystal of an acid Z separates out.

Write equations for all the above reactions and identify X, Y and Z.



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5. Write balanced equations for:



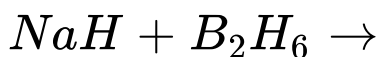
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6. Write balanced equations for:



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7. Write balanced equations for:



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8. List two important properties in which boron differs from the rest of the members of group. Mention the main reasons for the difference.



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9. What are electron-deficient compounds? Are  $BCl_3$  and  $SiCl_4$  electron-deficient species? Explain.



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**10.** Select the member (s) of group 14 that :

Forms the most acidic dioxide /



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**11.** Select the member (s) of group 14 that :

Is commonly found in + 2 oxidation state.



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**12.** Select the member (s) of group 14 that :

Used as semiconductor.



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**13.** What are allotropes ? Sketch the structure of two allotropes of carbon namely diamond and graphite.



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**14.** When carbon dioxide is passed through lime water, the solution turns milky, but, on prolonged passage, the solution turns clear.

This is because



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**15.** Why is graphite a good conductor of electricity but diamond is not?



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**16.** Give suitable reasons for the following :

Lead (IV) Chloride is highly unstable towards heat.



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**17.** Write the resonance structure of  $CO_3^{2-}$  and  $HCO_3^\ominus$ .



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**18.** Thermodynamically the most stable form of carbon is



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**19.** Explain why is there a phenomenal decrease in ionisation enthalpy from carbon to silicon?



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20. Mention an industrial application of silicones.



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### 5 Mark Question

1. When metal X is treated with sodium hydroxide, a white precipitate (A) is obtained, which is soluble in excess of NaOH to give soluble complex (B). Compound (A) is soluble

in dilute HCl to form compound (C). The compound (A) when heated strongly gives (D), which is used to extract metal. Identify (X), (A), (B), (C) and (D). Write suitable equations to support their identities.



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2. If  $B - Cl$  bond has a dipole moment, explain why  $BCl_3$  molecule has zero dipole moment.



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**3. Give reasons:** A mixture of dilute NaOH and aluminium pieces is used to open drain.



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**4. Give reasons:** Aluminium wire is used to make transmission cables.

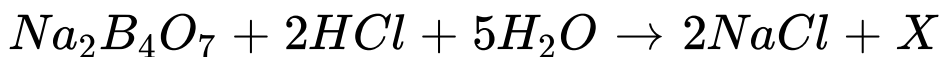


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5. Identify the compounds X and Y in the following reactions :

(a)



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6. Write the name of group 13 element which is used to measure high temperature.



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7. The +1 oxidation state is more stable than +3 oxidation state for thallium. Give reason.



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8. Compare the general trend in the following properties of the elements of group 13 and 14

:

Atomic size,



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**9.** Compare the general trend in the following properties of the elements of group 13 and 14

:

Ionisation enthalpy,



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**10.** Compare the general trend in the following properties of the elements of group 13 and 14

:

Metallic character,





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**11.** Compare the general trend in the following properties of the elements of group 13 and 14

:

Oxidation states,



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**12.** Compare the general trend in the following properties of the elements of group 13 and 14

:

Nature of halides.



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**13.** Name the following :

The crystalline form of silica used in modern radio and T.V broadcasting and mobile radio communication.



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**14.** Name the following :

The oxides of carbon which form a complex with haemoglobin 300 times more faster than oxygen.



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**15.** Name the following :

Two man made silicates.



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16. Explain the formation of (i) water gas (ii) producer gas. Give their uses. What happens when  $CO_2$  is passed through limewater? for short duration



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## Unit Test

1. Which of the following is a Lewis acid?

A.  $AlCl_3$

B.  $MgCl_2$

C.  $CaCl_2$

D.  $BaCl_2$

**Answer:**



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**2. Dry ice is**

A. Solid  $CO_2$

B. Solid  $SO_2$



C. Solid  $N_2$ g

D. Solid  $NH_3$

**Answer:**



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3. Chemical formula of diborane is .....



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4. Give an example of 'shape-selective catalyst'.



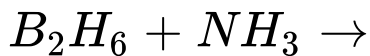
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5. Allotrope of carbon with  $sp^3$  hybridisation state is ..... ?



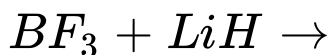
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6. Write balanced equations for:



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7. Write balanced equations for:



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8. Write two important applications of silicons.



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