



CHEMISTRY

VMC MODULES ENGLISH

p-BLOCK ELEMENTS-1

Level 0

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



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2. Boron is unable to form BF_6^{3-} ions due to



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

- A. Steric crowding
- B. Unavailability of d orbitals
- C. Both a and b
- D. None

Answer:



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4. Diamond is covalent, yet it has high melting point. Why ?



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5. What are silicones ?



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6. Why does boron trifluoride behave as a Lewis acid ?



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7. Is boric acid a protic acid ? Explain.



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8. Explain what happens when boric acid is heated .



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9. The shapes and hybridisation of BF_3 and BH_4^- respectively are



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10. Write reactions to justify amphoteric nature of aluminium.



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11. Write the resonance structures of CO_3^{2-} and HCO_3^- .



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12. What is the state of hybridisation of carbon in (a) CO_3^{2-}
(b) diamond (c) graphite?



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



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14. If B–Cl bond has a dipole moment, explain why BCl_3 molecule has zero dipole moment.



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15. Write the chemical formula of the following substances:

Borax



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16. Write the chemical formula of the following substances:

Metaboric acid



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17. Write the chemical formula of the following substances:

Boric acid



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18. Write the chemical formula of the following substances:

Sodium metaborate



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19. Write the chemical formula of the following substances:

Inorganic benzene

A. $B_4H_6N_2$

B. $B_3H_6N_3$

C. $B_3H_4N_2$

D. $B_4H_3N_6$

Answer:



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20. Write the chemical formula of the following substances:

inorganic graphite



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21. How would you explain the lower atomic radius of Ga as compared to Al ?



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22. Explain, why does boron not form B^{3+} ions.

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23. Given three reasons for anomalous behaviour of carbon.

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24. What do you mean by catenation? Name the group 14 element which has the maximum tendency towards catenation ?

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25. Suggest a reason as to why CO is poisonous.



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26. Rationalise the given statements and give chemical reactions : • Lead(II) chloride reacts with Cl_2 to give $PbCl_4$.
• Lead(IV) chloride is highly unstable towards heat. • Lead is known not to form an iodide, PbI_4 .



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27. What happens when Borax is heated strongly.



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28. What happens when Boric acid is added to water



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29. What happens when Aluminium is treated with dilute NaOH .



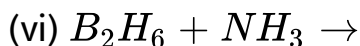
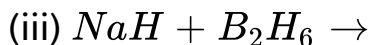
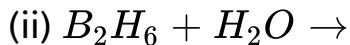
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30. What happens when BF_3 is reacted with ammonia?



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31. Write balanced equations for:



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32. Write balanced equations for: $B_2H_6 + H_2O \rightarrow$



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33. Write balanced equations for: $NaH + B_2H_6 \rightarrow$



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34. Write balanced equations for: $H_3BO_3 \xrightarrow{\Delta}$



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35. Write balanced equations for: $Al + NaOH \rightarrow$



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36. Write balanced equations for: $B_2H_6 + NH_3 \rightarrow$



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



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38. Explain why :

Conc. nitric acid can be stored in aluminium containers.



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39. Give reasons

A mixture of dilute NaOH and aluminium pieces is used to open drain.

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40. Give reasons

Graphite is used as lubricant.

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41. Give reasons

Diamond is used as an abrasive.

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42. Give reasons

Aluminium alloys are used to make aircraft body.

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43. Give reasons

Aluminium utensils should not be kept in water overnight.

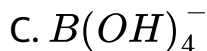
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44. Give reasons for the following: Aluminium is used in transmission wires.

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Level 1

1. Boron cannot form which one of the following anions?



Answer:



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2. Carbon cannot be used in the reduction of Al_2O_3 because:

A. it is expensive

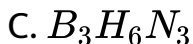
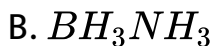
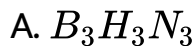
- B. The enthalpy of formation of CO_2 is more than that of Al_2O_3
- C. Pure carbon is not easily available
- D. The enthalpy of formation of Al_2O_3 is too high

Answer:



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3. Inorganic benzene is



D. $H_3B_3H_6$

Answer:



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4. Which is a correct statement about diborane structure ? .

- A. 1. All HBH bond angles are equal
- B. 2. All bond lengths are equal
- C. 3. It has two three-centre-two electron bonds
- D. 4. All hydrogen and boron atoms are in one plane

Answer:



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5. Which one of the following is the correct statement ?

A. 1. Boric acid is a protic acid

B. 2. Beryllium exhibits coordination number of six

C. 3. Chlorides of both beryllium and aluminium have
bridged chloride structures in solid phase

D. 4. $B_2H_6 \cdot 2NH_3$ is known as inorganic benzene

Answer:



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6. Boron halides are

- A. 1.proton donor compounds
- B. 2.covalent compounds
- C. 3.electron deficient compounds
- D. 4.ionic compounds

Answer:



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7. An element X occurs in short period having configuration ns^2np^1 . The formula and nature of its oxide is:

- A. XO_3 , basic
- B. X_2O_3 , basic
- C. X_2O_3 acidic

D. XO_2 , acidic

Answer:



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8. The structure of diborane (B_2H_6) contains :

A. Four $2c - 2e^-$ bonds and four $3c - 2e^-$ bonds

B. Two $2c - 2e^-$ bonds and two $3c - 2e^-$ bonds

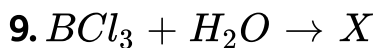
C. Two $2c - 2e^-$ bonds and four $3c - 2e^-$ bonds

D. Four $2c - 2e^-$ bonds and two $3c - 2e^-$ bonds

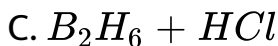
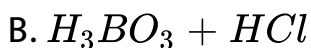
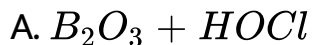
Answer:



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The products formed in the above reaction are



D. No reaction

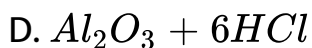
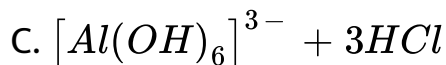
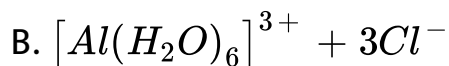
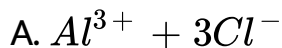
Answer:



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10. Aluminium chloride exists as a dimer, Al_2Cl_6 in solid state as well as in solution of non-polar solvents such as

benzene. When dissolved in water, it gives :



Answer:



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11. Al_4C_3 is a ionic carbide, named as:

A. Acetylde

B. Methanide

C. Allylide

D. Alloy

Answer:



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12. बोरिक एसिड अम्ल है, क्योंकि

A. H_3BO_3 molecules are loosely chemically bonded and hence soft

B. Its low density makes it fluffy

C. It can be powdered to a very small grain size

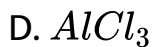
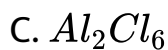
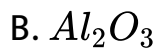
D. It is chemically inert with the plywood

Answer:



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13. Heating an aqueous solution of aluminium chloride to dryness will give

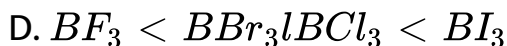
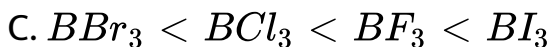
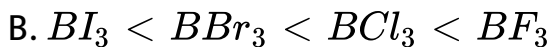
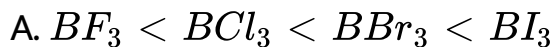


Answer:



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14. The correct order of Lewis acidic strength of boron trihalides :

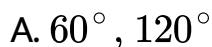


Answer:



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15. In diborane, the two $H - B - H$ angles are nearly



B. 95° , 120°

C. 95° , 150°

D. 120° , 180°

Answer:



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16. In group 13, Tl (thallium) shows +1 oxidation state while other members show +3 oxidation state, why ?

A. Presence of lone electron in Tl

B. Inert pair effect

C. Large ionic radius of Tl ion

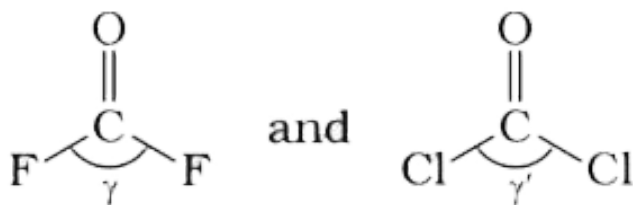
D. None of these

Answer:



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17. Correct order of bond angles in the given compounds is/are



A. $\gamma > \gamma'$

B. $\gamma < \gamma'$

C. $\gamma = \gamma'$

D. Can't be predicted

Answer:



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18. The correct order of increasing atomic radii, is :

A. $B < Al < Ga$

B. $Ga < Al < B$

C. $Al < B < Ga$

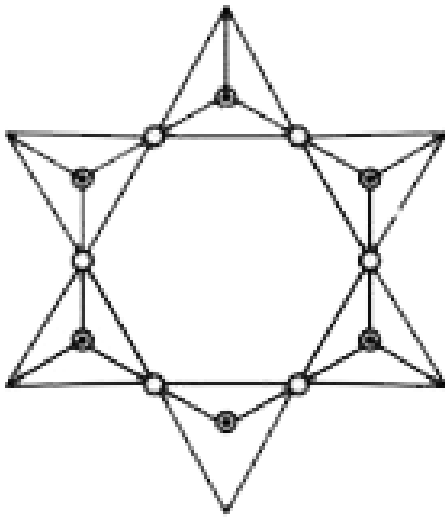
D. $B < Ga < Al$

Answer:



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19. Which type of silicate is shown in the given figure ?



- A. Orthosilicate
- B. Pyrosilicate
- C. Sheet silicate
- D. None of these

Answer:





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20. Buckminsterfullerene is a variety of :

A. Boron

B. Carbon

C. Sulphur

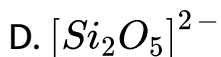
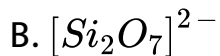
D. Phosphorous

Answer:



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21. The basic structural unit in silicates is

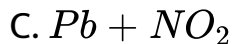
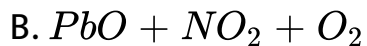
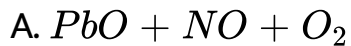


Answer:



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22. On strong heating lead nitrate gives:



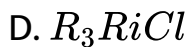
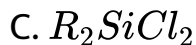
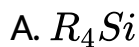


Answer:



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23. Among the following substituted silanes, the one which will give rise to cross linked silicon polymer on hydrolysis is

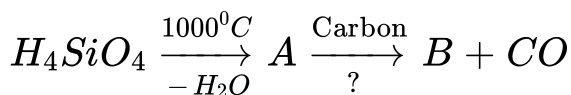


Answer:



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24. Identify B in the following



A. Corundum

B. Quartz

C. Silica

D. Carborundum

Answer:



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25. In silica (SiO_2) each silicon is bonded to :

- A. Two oxygen atoms
- B. Four oxygen atoms
- C. One silicon and two oxygen atoms
- D. One silicon and four oxygen atoms

Answer:



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26. The incorrect statements among the following is/are :

- I. Fullerene is molecular solid
- II. Lead prefers to form tetravalent compounds
- III. The three $\text{C} - \text{O}$ bonds are not equal in the carbonate

ion

IV. Both B_2 and C_2 are paramagnetic

A. I, III and IV

B. I and IV

C. II, III and IV

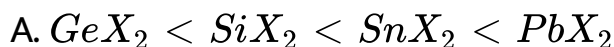
D. I and III

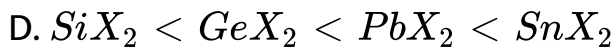
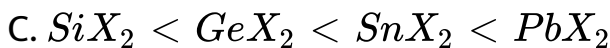
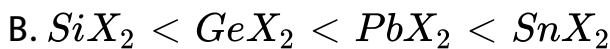
Answer:



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27. The stability of dihalides of Si, Ge, Sn and Pb increases steadily in the sequence





Answer:



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28. In SiF_6^{2-} and $SiCl_6^{2-}$, which one is known and why ?

A. SiF_6^{2-} because of small size of F

B. SiF_6^{2-} because of large size of F

C. $SiCl_6^{2-}$ because of small size of Cl

D. $SiCl_6^{2-}$ because of large size of Cl

Answer:



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29. Graphite is used as a lubricant in machinery.

- A. Is a non-crystalline substance
- B. Is an allotropic form of diamond
- C. Has molecules of variable molecular masses like polymers
- D. Has carbon atoms arranged in large plates of rings of strongly bound carbon atoms with weak interplate bonds

Answer:



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30. Water glass is :

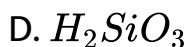
- A. 1. Glass made of water
- B. 2. Sodium silicate
- C. 3. Calcium formate
- D. 4. Pyrex glass

Answer:



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31. Monosilane on coming in contact with air burns with a luminous flame producing vortex rings. These rings are of



Answer:



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32. Which one of the following statements about the zeolite is false?

- A. They are used as cation exchangers
- B. They have open structure which enables them to take up small molecules
- C. Zeolites are aluminosilicates having three dimensional network
- D. Some of the SiO_4^{4-} units are replaced by AlO_4^{5-} and concentrated ions in zeolites

Answer:



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33. A metal, M forms chloride in its +2 and +4 oxidation states. Which of the following statements about these

chlorides is correct ?

- A. MCl_2 is more easily hydrolysed than MCl_4
- B. MCl_2 is more soluble in the anhydrous ethanol than MCl_4
- C. MCl_2 is more ionic than MCl_4
- D. all of the above

Answer:



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34. Buckminster fullerene :

- A. is covalent network solid

B. has only sp^2 hybridised carbon atoms

C. is non aromatic

D. is thermodynamically most stable form of carbon

Answer:



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35. Addition of $SnCl_2$ to $HgCl_2$ gives precipitate:

A. White turning to red

B. White turning to grey

C. Black turning to white

D. None of the above

Answer:



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36. Name the type of the structure of silicate in which one oxygen atom of $[SiO_4]^{4-}$ is shared ?

- A. Pyrosilicate
- B. Sheet silicate
- C. Linear chain silicate
- D. Three dimensional silicate

Answer:



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37. If a trivalent atom replaces a few silicon atoms in three dimensional network of silicon dioxide, what would be the type of charge on overall structure ?

- A. There are double bonds between silicon and oxygen atoms
- B. Silicon atom is bonded to two oxygen atoms
- C. Each silicon atom is surrounded by two oxygen atoms and each oxygen atom is bonded to two silicon atoms
- D. Each silicon atom is surrounded by four oxygen atom and each oxygen atom is bonded to two silicon atoms

Answer:



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38. 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

A. $C > Si > Ge = Sn > Pb$

B. $C < Si < Ge = Sn < Pb$

C. $C > Si < Ge < Sn < Pb$

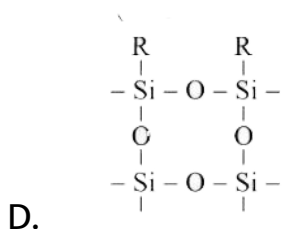
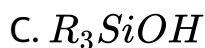
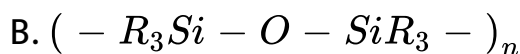
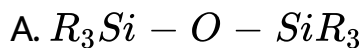
D. $C > Si = Ge = Sn > Pb$

Answer:



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39. On controlled hydrolysis and condensation, R_3SiCl yields



Answer:



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40. When tin is treated with concentrated nitric acid

- A. It is converted into stannous nitrate
- B. It is converted into stannic nitrate
- C. It is converted into metastannic acid
- D. It becomes passive

Answer:



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41. $(CH_3)_2SiCl_2$ undergoes hydrolysis but $(CH_3)_2CCl_2$ does not why?

- A. Low lying d-orbitals are present in Si but not in C
- B. Only 3 p orbitals are involved in C
- C. Silicon is more acidic

D. Si-Cl bond is more polar than $C - Cl$ bond

Answer:



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42. Which one shows most pronounced inert pair effect ?

A. Si

B. Sn

C. Pb

D. C

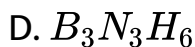
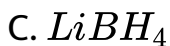
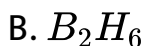
Answer:



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43. Which of the following is the electron deficient molecule

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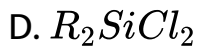
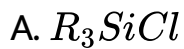


Answer:



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44. Which of the following organo-silicon compound on hydrolysis will give cyclic silicone ?

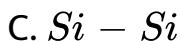
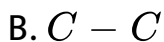
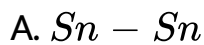


Answer:



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45. Bond energy is highest for :



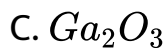
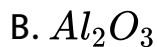
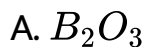
D. $Ge - Ge$

Answer:



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46. Which amongst the following is also called as a sesqui oxide :



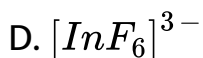
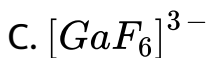
D. all

Answer:



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47. Which of the following species does not exist?

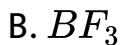
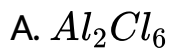


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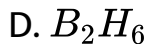


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48. Dative bonds are not present in :



C. Borazole

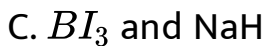
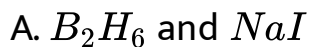


Answer:



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49. All the products formed in the oxidation of $NaBH_4$ by I_2 are



D. NaBI_4 and HI

Answer:



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50. Select correct statement about H_3BO_3

- A. It has triangular $\text{BO}_3(3-)$ units
- B. In solid states, molecules are hydrogen bonded
- C. Both the above statements 1 and 2 are correct
- D. None of the statement is correct

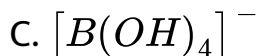
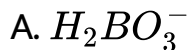
Answer:



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51. Orthoboric acid behaves as weak monobasic acid giving

H^+ and _____.



Answer:



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52. BCl_3 does not exist as dimer but BH_3 exist as dimer

(B_2H_6) because :-

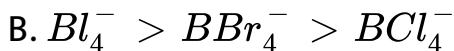
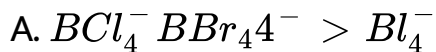
- A. Cl is more electropositive than H
- B. There is $p\pi - p\pi$ back bond in BCl_3 but BH_3 does not contain such multiple bonding.
- C. Large sized chlorine atoms do not fit in between small sized boron atoms where as small sized hydrogen atoms get fitted in between boron atoms
- D. None of these

Answer:



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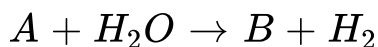
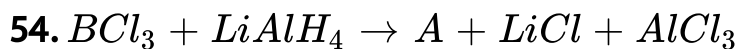
53. With a given anion the correct stability order of tetra haloborates is :



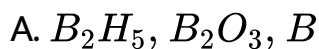
Answer:



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$B \xrightarrow{\text{Red heat}} C$. In this reaction sequence A, B and C compounds respectively are :



B. B_2H_6 , H_3BO_3 , B_2O_3

C. B_2H_6 , H_3BO_3 , B

D. $HBCl_4$, H_3BO_3 , B_2O_3

Answer:



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55. Which is not correct in case of Be and Al ?

A. Both are rendered passive by conc. HNO_3

B. Carbides of both give methane on hydrolysis

C. Both give hydroxides which are basic

D. Both give covalent chlorides

Answer:



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56. Give reasons

Graphite is used as lubricant.

- A. The slippery nature
- B. Its giant structure
- C. High refractive index
- D. High IP value of carbon

Answer:



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57. $SiF_4 + H_2O \rightarrow A \xrightarrow{1000^{\circ}C} B \xrightarrow{Na_2CO_3} C$ Identify B & C ?

A. H_4SiO_4 , Na_2SiO_3

B. SiO_2 , SiC

C. SiO_2 , Na_2CO_3

D. SiO_2 , Na_2SiO_3

Answer:



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58. Decreasing order of "P" orbital Character in the following

a) SiO_2 , CO_2 , c) Graphite

A. $a > b > c$

B. $b > a > c$

C. $b > c > a$

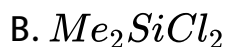
D. $a > c > b$

Answer:



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



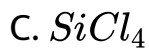


Answer:



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60. Which of the following salt undergoes hydrolysis?



D. All of these

Answer:



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61. Which is correct regarding CO_2 .

A. Involves in photosynthesis

B. Cause green house effect

C. Dry ice is used as refrigerant for ice cream & frozen food

D. All of these

Answer:



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62. Hydrolysis of $SiCl_4$ gives compound 'X' and HCl on heating to $1000^\circ C$ 'X' loses water and forms 'Y'. Identify 'X' and 'Y' respectively.

- A. SiO_2 and Si
- B. H_4SiO_4 and SiO_2
- C. SiO_2 and SiC
- D. H_4SiO_4 and SiC

Answer:



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63. The correct statement with respect to CO is

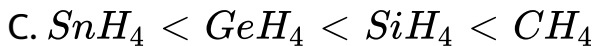
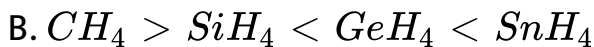
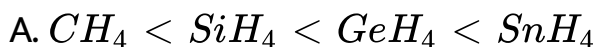
- A. It combines with H_2O to give carbonic acid
- B. It reacts with haemoglobin in RBC
- C. It is a powerful oxidizing agent
- D. It is used to prepare aerated drinks

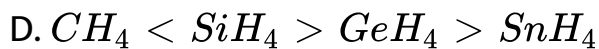
Answer:



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64. The correct order for boiling point of IV group hydrides respectively :





Answer:



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65. Shape of $\dot{C}H_3$ is

A. Linear

B. Pyramidal

C. Tetrahedral

D. Trigonal planar

Answer:



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66. The tetravalent elements A and B form dioxides both react with NaOH to form similar salts $\angle OAO$ is 180° and $\angle OBO$ is $109^\circ 28'$. Both are acidic in nature A and B are respectively

A. Ge and Si

B. S and Si

C. C and Si

D. Si and C

Answer:



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67. Which of the following compounds is formed by addition of mineral acid to an aqueous solution of borax?

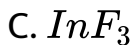
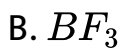
- A. Boron oxide
- B. Orthoboric acid
- C. Metaboric acid
- D. Pyroboric acid

Answer:

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68. Which of the following is not an ionic tri halide :

- A. AlF_3



Answer:



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69. Alumina is insoluble in water because:

A. It is covalent compound

B. It has a high lattice energy and low heat of hydration

C. It has low lattice energy and high heat of hydration

D. It is a network solid

Answer:



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70. When oxalic acid is heated with concentrated H_2SO_4 it produces

A. CO, CO_2, H_2O

B. SO_2, CO_2, H_2O

C. CO, SO_2, H_2O

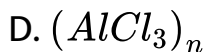
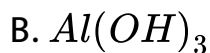
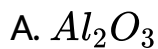
D. SO_2, SO_3, H_2O

Answer:



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71. Which of the following sublimes on heating ?



Answer:



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72. In sheet silicate number of oxygen atoms involved in sharing are

A. 2

B. 3

C. 4

D. 0

Answer:



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73. Silicones repel water due to:

A. the presence of alkyl group pointed towards surface

B. strong $Si - O - Si$ bonds

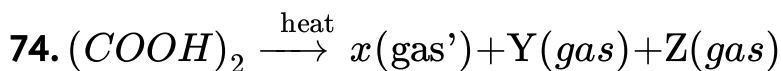
C. low surface area

D. high vander Waal's forces

Answer:



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Y and Z both are polar and neutral, X is non polar and acidic. Z gas is condensed and formed liquid having $ph = 7$. The hybridization state of X , Y and Z are respectively

A. sp , sp^2 , sp^3

B. sp^2 , sp^2 , sp^2

C. sp , sp , sp^3

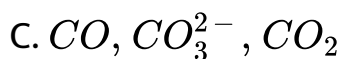
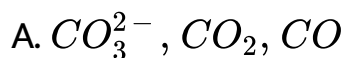
D. sp^2 , sp , sp^3

Answer:



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75. The correct order of C-O bond length among CO , CO_3^{2-} , CO_2 is

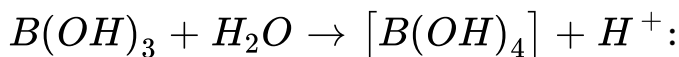


Answer:



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1. In the following reaction :



- A. $B(OH)_3$ is a Lewis acid
- B. $B(OH)_3$ is amphoteric
- C. $B(OH)_3$ is a Lewis base
- D. None is correct

Answer:



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2. In the following statements, select the correct statement(s) :

- A. $N(CH_3)_3$ has pyramidal structure
- B. $N(SiH_3)_3$ shows planar arrangement
- C. Both are correct
- D. None is correct

Answer:



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3. The dipole moments of the given molecules are such that :





Answer:



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4. Boron carbide is used :

A. In nuclear reactor to absorb neutrons

B. As an abrasive

C. Both are correct

D. None is correct

Answer:



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5. Aqueous solution of borax reacts with two mol of acids.

This is because of :

A. formation of 2 mol of $B(OH)_3$ only

B. formation of 2 mol of $[B(OH)_4]^-$ only

C. formation of 1 mol each of $B(OH)_3$ and $[B(OH)_4]^-$

D. formation fo 2 mol of $[B(OH)_4]^-$

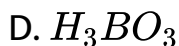
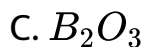
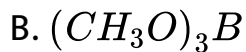
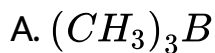
Answer:



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6. While testing BO_3^{3-} there is green edged flamed on heating the ssalt with conc. H_2SO_4 and CH_3OH . Green

colour is of

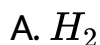


Answer:



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7. The gaseous product(s) expected at room temperature by reaction of sodium borohydride and boron trifluoride under anhydrous conditions is/are:



B. B_2H_3 and H_2

C. B_2H_6

D. BH_2F and H_2

Answer:



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8. Choose the correct sequence for the geometry of the given molecules

Borazon, Borazole, $B_3O_6^{3-}$, trimer of FCN.

['P' stands for planer and 'NP' standes for non-planer]

A. NP,NP,NP

B. P,P,NP

C. NP,NP,P

D. NP,P,P

Answer:



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9. Borax is used as a cleaning agent because on dissolving in water, it gives

A. Alkaline solution

B. Acidic solution

C. Bleaching solution

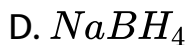
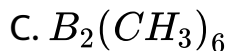
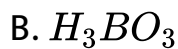
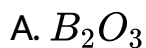
D. Basic solution

Answer:



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10. From B_2H_6 , all the following can be prepared except

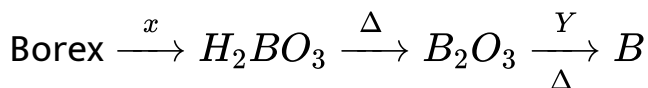


Answer:



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11. Borax is converted into crystalline boron by the following steps :



X and Y are respectively :

A. HCl, Mg

B. HCl, C

C. C, Al

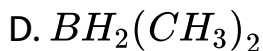
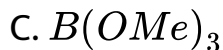
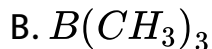
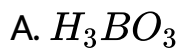
D. HCl, Al

Answer:



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12. B_2H_6 on reaction with methanol does not form



Answer:



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13. Which of the following is a true statement ?

A. Boranes are easily hydrolysed

B. $LiAlH_4$ reduces BCl_3 to borane

C. BH_3 is Lewis acid

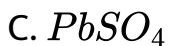
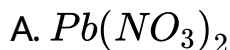
D. All the B-O distances on borax are equal

Answer:



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14. Which of the following is sparingly soluble in cold water and fairly soluble in hot water?



Answer:

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15. Match the column:

Column I		Column II	
(A)	Borax $\xrightarrow{\Delta}$	(p)	$B_3N_3H_6$
(B)	$B_2H_6 + H_2O \longrightarrow$	(q)	B_2H_6
(C)	$B_2H_6 + NH_3 \xrightarrow[\text{excess}]{\Delta}$	(r)	H_3BO_3
(D)	$BCl_3 + LiAlH_4 \longrightarrow$	(s)	$NaBO_2 + B_2O_3$

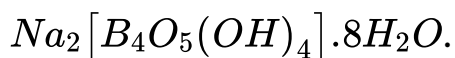
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16. Match the column:

Column I		Column II	
(A)	Inorganic benzene	(p)	$Na_2B_4O_7 \cdot 10H_2O$
(B)	Jeweller's borax	(q)	B_2H_6
(C)	Borax	(r)	$Na_2B_4O_7 \cdot 5H_2O$
(D)	Diborane	(s)	Mordant
		(t)	$B_3N_3H_6$

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17. Borax is actually made of two tetrahedra and two triangular units joined together and should be written as



Consider the following statements about borax :

A : Each boron atom has four $B - O$ bonds.

B : Each boron atom has three $B - O$ bonds.

C : Two boron atoms have four $B - O$ bonds while other two have three $B - O$ bonds.

D : Each boron atom has one-OH group.

Select correct statement (s) :

A. I,II

B. II,III

C. III,IV

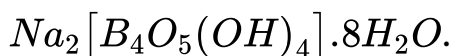
D. I,III

Answer:



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18. Borax is actually made of two tetrahedra and two triangular units joined together and should be written as



Select the correct statement (s) :

A. Borax is used as a buffer

B. 1 M borax solution reacts with equal volumes of 2 M
HCl solution

C. Titration of borax can be made using methyl orange
as the indicator

D. Coloured bead obtained in borax bead test contains metaborate

Answer:



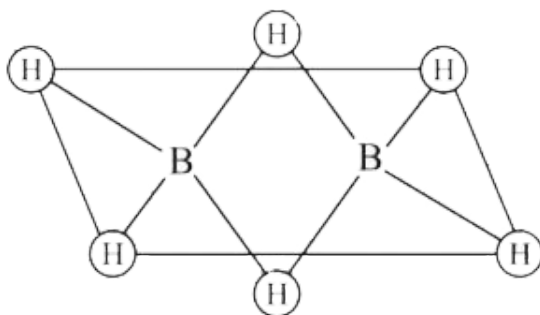
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19. The reason for small radius of Ga compared to Al is

- A. Poor screening effect of d and f orbitals
- B. Increase in nuclear charge
- C. Presence of higher orbitals
- D. Higher atomic number

Answer:

20. Which of the following statements are correct. Answer on the basis of figure :



- A. The two bridged hydrogen atoms and the two boron atoms lie in one plane
- B. Out of six $B - H$ bonds, two bonds can be described in terms of 3-centre 2-electron bonds

- C. Out of six $B - H$ bonds, four $B - H$ bonds can be described in terms of 3-centre 2-electron bonds
- D. The four terminal $B - H$ bonds are 2-centre 2-electron regular bonds

Answer:



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21. One can obtain a silica garden if :

- A. Crystals of coloured cations are added to a strong solution of sodium silicate
- B. Sodium silicate solution is treated with a base

C. SiF_4 is hydrolysed

D. Silicon salts are grown in a garden

Answer:



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22. Silicon carbide is used as

A. abrasive

B. dehydrating agent

C. solvent

D. catalyst

Answer:



23. A student prepared a sample of silicon chloride by passing chlorine over heated silicon and collecting the condensed silicon chloride in a small specimen tube. He analysed the chloride in a small specimen tube. He analysed the chloride by dissolving a known mass of it in water, and titrating the solution with standard silver nitrate solution. The formula of the silicon chloride as obtained by this method was $SiCl_{2.6}$ as against a 'true' formula of $SiCl_4$. Which of the following possible errors could have resulted in this wrong formula ?

- A. The excess silicon chloride obtained is dissolved in chlorine

- B. The "standard" silver nitrate solution was less concentrated than was stated on the label
- C. More silicon chloride than the student supposed was actually used owing to inaccurate weighing
- D. The small specimen tube was not dry

Answer:



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24. Assertion (A) : Silicones are water repelling in nature

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

- A. Statement-1 is True, Statement-2 is True and Statement-2 is a correct explanation for Statement-1
- B. Statement-1 is True, Statement-2 is True and 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

Answer:



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25. The linear shape of CO_2 is due to

- A. tetravalency of carbon
- B. sp hybridisation of carbon
- C. $p\pi - p\pi$ bonding between carbon and oxygen
- D. catenation property of carbon

Answer:



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26. Me_3SiCl is used during polymerisation of organosilicones because

- A. The chain length of the organo silicon polymers can be controlled by adding Me_3SiCl

B. Me_3SiCl blocks the end terminals of silicone polymer

C. Me_3SiCl improves the quality and yield of the polymer

D. Me_3SiCl acts as a catalyst during polymerization

Answer:



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27. Which of the following statements are correct :

A. Fullerenes have dangling bonds

B. Fullerenes are cage-like molecules

C. Graphite is thermodynamically most stable allotrope of carbon

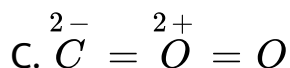
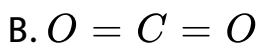
D. Graphite is slippery and therefore used as a dry lubricant in machines

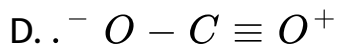
Answer:



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28. Identify the correct resonance structures of carbon dioxide from the one given below:



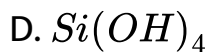
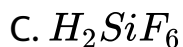
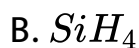
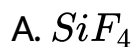


Answer:



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29. Silicon dissolves in excess of HF due to formation of

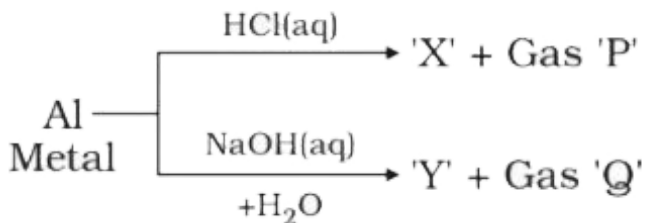


Answer:



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30. The incorrect statement regarding below reaction is :



- A. Al shows amphoteric character
- B. Gas 'P' and 'Q' are different
- C. Both X and Y are water soluble
- D. Gas Q is inflammable

Answer:



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31. The plague OR tin pest or tin disease refers to .

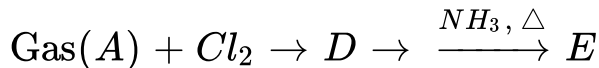
- A. conversion of stannous to stannic
- B. conversion of white tin to grey tin
- C. emission of sound while bending a tin rod
- D. atmospheric oxidation of tin

Answer:



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32. $H_2C_2O_4 \xrightarrow{\Delta} \text{gas}(A) + \text{gas}(B) + \text{liquid}(C)$. Gas(A) burns with a blue flame and is oxidised to gas(B).



A, B, C and E are

A. CO_2 , CO , H_2O , HCONH_2

B. CO , CO_2 , COCl_2 , HCONH_2

C. CO , CO_2 , H_2O , NH_2CONH_2

D. CO , CO_2 , H_2O , COCl_2

Answer:



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33. Amphibole silicate structure has 'x' number of corner shared per tetrahedron. The value of x is :

A. 2

B. $2\frac{1}{4}$

C. 3

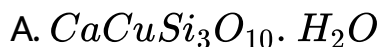
D. 4

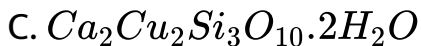
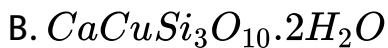
Answer:



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34. The silicate ion in the mineral kinoite is a chain of three SiO_4^{4-} tetrahedral that share corners with adjacent tetrahedral. The mineral also contains Ca^{2+} ions, Cu^{2+} ions and water molecules in 1:1:1 ratio. The mineral is represented as





D. None of these

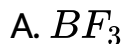
Answer:



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35. $BX_3 + NH_3 \xrightarrow{B.T.} BX_3 \cdot NH_3 + \text{Heat}$ of adduct formation (ΔH)

The numerical value of ΔH is found to be maximum for:



D. BI_3

Answer:



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36. Statement-1: $Al(OH)_3$ is amphoteric in nature.

Statement-2: It cannot be used as an antacid.

A. Statement-1 is True, Statement-2 is True and

Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True and

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

Answer:



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37. Assertion : Among $SiCl_4$ and CCl_4 only $SiCl_4$ reacts with water.

Reason : $SiCl_4$ is ionic and CCl_4 is covalent .

A. Statement-1 is True, Statement-2 is True and

Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True and

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

Answer:



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38. Statement I: Pb^{4+} compounds are stronger oxidizing agents than Sn^{4+} compounds.

Statement II: The higher oxidation states for the group 14 elements are more stable for the heavier members of the group due to 'inert pair effect'.

A. Statement-1 is True, Statement-2 is True and

Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True and
Statement-2 is NOT a correct explanation for
Statement-1

C. Statement-1 is True, Statement-2 is False

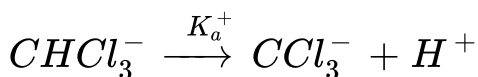
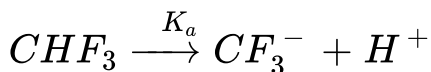
D. Statement-1 is False, Statement-2 is True

Answer:

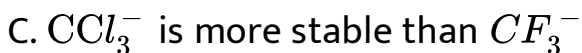
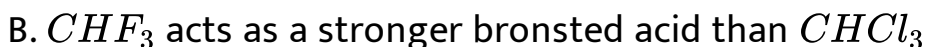
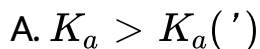


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39. Consider of following reactions



Then regarding given reactions which of the following statement(s) is /are correct:



Answer:



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40. Choose the correct order of C-C bond length in the given compounds:



B. Acetylene It ethylene It benzene It graphite It ethane

C. Acetylene It graphite It ethylene It benzene It ethane

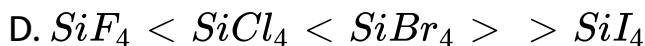
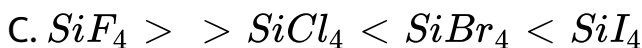
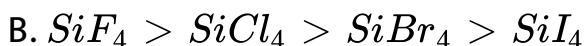
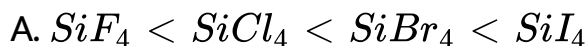
D. Acetylene It benzene It graphite It ethylene It ethane

Answer:



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41. The correct order of thermal stability of silicon tetrahalides is



Answer:



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42. Which of the following statements is true ?

A. Dimethyl ether is a better Lewis base than disilyl

ether ($\text{SiH}_3 - \text{O} - \text{SiH}_3$)

B. $(\text{CH}_3)_3\text{C} - \text{O} - \text{H}$ is less acidic than

$(\text{CH}_3)_3\text{Si} - \text{O} - \text{H}$

C. Both the statements (A) and (B) are true

D. Both the statements (A) and (B) are false

Answer:



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43. Which of the following process is/are associated with change of hybridisation of the underlined compounds?

- A. B_2H_6 is dissolved in THF
- B. $Al(OH)_3$ precipitate dissolved in NaOH
- C. SiF_4 vapour is passed through liquid HF
- D. Hydrolysis of $SiCl_4$

Answer:



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44. Which of the following is/are correct statement ?

- A. Zeolites are often used as ion exchange material
- B. SiO_2 is a linear molecule
- C. $C_{12}O_9$ is known but C_3O_2 is not
- D. Producer gas is less efficient fuel in terms of calorific value than water gas

Answer:



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45. Which of the following statements is/are correct

- A. The $p\pi - d\pi$ bonding in $(SiH_3)_3N$

B. π - bond pair of e^- of each ends are perpendicular to each other in CO_2

C. π - bond pair of e^- of each ends are perpendicular to each other in C_3O_2

D. Carbon is mixture of carbondioxide and O_2

Answer:



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46. Choose the incorrect statement (s) from the following

A. the anhydride of malonic acid is C_3O_2

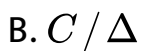
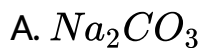
- B. there are two sigma and one pi bond in CaC_2 molecule
- C. SiC is called carborundum
- D. Trisilylamine is pyramidal

Answer:



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47. SiO_2 reacts with

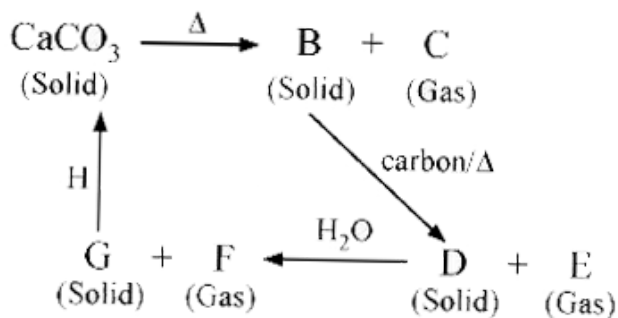


D. XeF_2

Answer:



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48.

The compound E is

A. CO

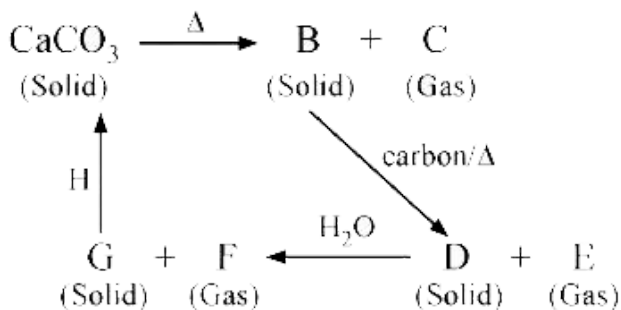
B. CO_2

C. C_3O_2

D. Oxide of metal

Answer:

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49.

The correct statement about F is

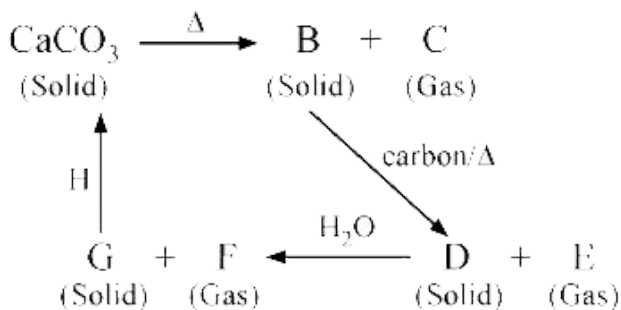
- A. it has 3σ and 2π bond
- B. it has 3σ bond and one π bond
- C. it has angular shape

D. it is H_2 gas

Answer:



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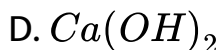
50.

The compound H is :

A. CO_2

B. CO

C. CaO

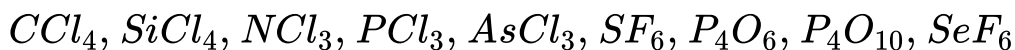


Answer:



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51. total number of molecule which hydrolysed at room temperature and hybridization of central atom is sp^3d in transition state:



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52. The difference between total number of lone pairs and total number of σ -bonds in $[B_3O_3(OH)_6]^{3-}$ molecular ion

is:



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53. Borazine is converted into a disubstituted product $B_3N_3H_4X_2$. Number of isomers would be:



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54. Consider the structure of Al_2Me_6 compound and find the value of $\frac{x - y}{z}$ where x = maximum number of atoms that can lie in place having terminal ($Al - Me$) bonds

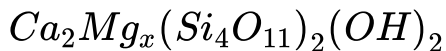
y = total number of $3c - 2e^-$ bonds

z = total number of atoms that are sp^3 hybridized.



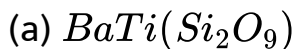
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55. Find the value of x in the tremolite abestos:



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56. Consider the following silicates



Then calculate $X+Y$, where X and Y are total number of monovalent and divalent oxygen atoms in both silicates respectively.



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57. Consider $Al_2(OH)_6$ compound and calculate the vale of

$$(X + Y) := Z$$

Where X= Total number of $(2c - 2e^-)$ bond.

Where Y=Total number of $(3c - 2e^-)$ bond.

Where Z= Total number of $(3c - 4d^-)$ bond.



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58. Number of hydroxyl groups present in $H_4P_2O_6$ are :

A. 2

B. 4

C. 6

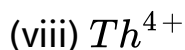
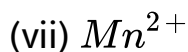
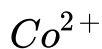
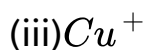
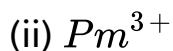
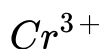
D. 3

Answer:



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59. Write down the electronic configuration of: ItBrgt (i)



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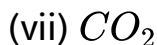
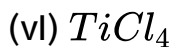
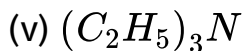
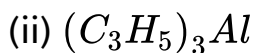
60. Consider the following species: $(C_3H_5)_3Al$

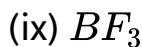
Find out total number of species which can act as Lewis acid.



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61. Consider the following species:



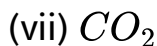
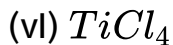
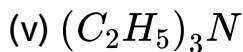
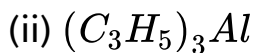


the find out total number of species which can act as Lewis acid.



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62. Consider the following species:



(ix) BF_3

the find out total number of species which can act as Lewis acid.



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63. Consider the following species and find out total number of species which are polar and can act as Lewis acid
 $CCl_4, CO_2, SO_2, AlCl_3, HCHO, SO_3, SiCl_4, BCl_3, CF_4$

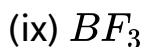
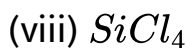
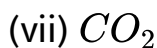
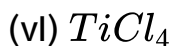
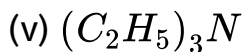


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64. Consider the following species:

(i) CH_3^+

(ii) $(C_3H_5)_3Al$

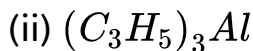


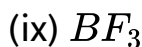
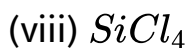
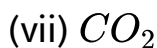
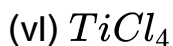
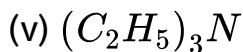
the find out total number of species which can act as Lewis acid.



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65. Consider the following species:



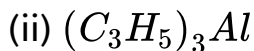


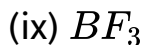
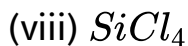
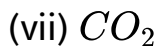
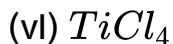
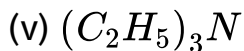
the find out total number of species which can act as Lewis acid.



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66. Consider the following species:



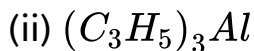


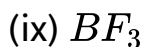
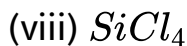
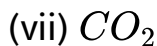
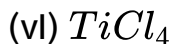
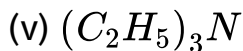
the find out total number of species which can act as Lewis acid.



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67. Consider the following species:





the find out total number of species which can act as Lewis acid.



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68. Consider the following species:

CF_4 , GeH_4 , BCl_3 , $AlBr_3$, H_2O , PH_3 , PCl_5 , CO_2 , CH_4 and

calculate value of $(x - y)^2$:

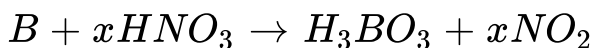
Where, x: Total number of species which can act as only lewis acid.

y: total number of species which can act as lewis acid as well as lewis base.



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69. In the given reaction the value of x is _____.



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70. In borazine, the number of delocalized electrons are_____.



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71. The number of bridge chlorine in Al_2Cl_6 is _____.

A. 2

B. 4

C. 6

D. 3

Answer:



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72. In borax number of sp^2 hybridised atoms are _____.

A. 2

B. 3

C. 4

D. 1

Answer:



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73. One mole aluminium carbide reacts with water to give
_____ moles of methane.

A. 2

B. 3

C. 1

D. 4

Answer:



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1. Alum helps in purifying water by

- A. forming Si complex with clay particles
- B. sulphate part which combines with the dirt and removes it
- C. coagulating the mud particles
- D. making mud water soluble

Answer:



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2. Glass is a:

A. micro-crystalline solid

B. super-cooled liquid

C. gel

D. polymeric mixture

Answer:



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3. Graphite is a soft solid lubricant extremely difficult to melt. The reason for this anomalous behaviour is that graphite

A. is a non-crystalline substance

B. is an allotropic form of diamond

C. has molecules of variable molecular masses like polymers

D. has carbon atoms arranged in large plates of rings of strongly bound carbon atoms with weak interplate bonds

Answer:



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4. The soldiers of Napoleon army while at Alps during freezing winter suffered a serious problem with regard to the tin buttons of their uniform. White metallic tin buttons get converted to grey powder. This transformation is relate to

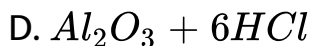
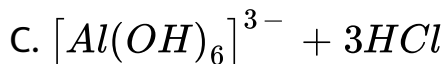
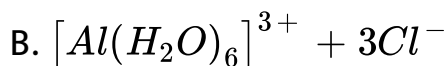
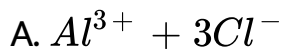
- A. an interaction with nitrogen of the air at very low temperatures
- B. a change in the crystalline structure of tin
- C. a change in the partial pressure of oxygen in the air
- D. an interaction with water vapour contained in the humid air

Answer:



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5. Aluminium chloride exists as dimer, Al_2Cl_6 in solid state as well as in solution of non-polar solvents such as benzene. When dissolved in water, it gives :



Answer:



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6. The states of hybridisation of boron and oxygen atoms in boric acid (H_3BO_3) are respectively :

A. sp^2 and sp^2

B. sp^2 and sp^3

C. sp^3 and sp^2

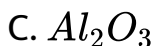
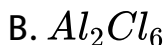
D. sp^3 and sp^3

Answer:



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7. Heating an aqueous solution of aluminium chloride to dryness will give :



Answer:



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8. The number and type of bonds between two carbon atoms in calcium carbide are

- A. one sigma, one pi
- B. one sigma, two pi
- C. two sigma, one pi
- D. two sigma, two pi

Answer:



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9. The structure of diborane (B_2H_6) contains :

- A. four $2c-2e$ bond and two $3c-2e$ bonds
- B. Two $2c - 2e^-$ bonds and two $3c - 2e^-$ bonds
- C. Two $2c - 2e^-$ bonds and four $3c - 2e^-$ bonds

D. Four $2c - 2e^-$ bonds and two $3c - 2e^-$ bonds

Answer:



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10. in silicon dioxide :

A. each silicon atom is surrounded by four oxygen atoms and each oxygen atom is bounded to two silicon atoms

B. each silicon atom is surrounded by two oxygen atoms and each oxygen atom is bounded to two silicon atoms

C. silicon atom is bonded to two oxygen atoms

D. there are double bonds between silicon and oxygen atoms

Answer:



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11. Which of the following oxides is amphoteric in character ?

A. CaO

B. CO_2

C. SiO_2 and SiC

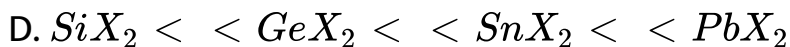
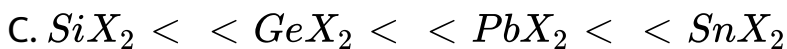
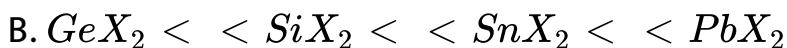
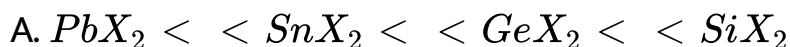
D. SnO_2

Answer:



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12. The stability of dihalides of Si, Ge, Sn and Pb increases steadily in the sequence

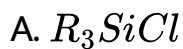


Answer:



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13. Among the following substituted silanes the one which will give rise to cross linked silicone polymer on hydrolysis is :



Answer:



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14. Which of the following is the correct statement ?

- A. B_2H_6 , $2NH_3$ is known as inorganic benzene.
- B. Boric acid is a protonic acid.
- C. Beryllium exhibits coordination number of six.
- D. Chlorides of both beryllium and aluminium have bridged chloride structures in solid phase.

Answer:



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15. The bond dissociation energy of B-F in BF_3 is 646 kJ mol^{-1} whereas that of C-F in CF_4 is 515 kJ mol^{-1} . The correct reason for higher B-F bond dissociation energy as compared to that of C-F bond is

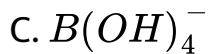
- A. smaller size of B-atom compared to that of C-atom
- B. stronger σ bond between B and F in BF_3 as compared to that between C and F in CF_4
- C. significant $p\pi - p\pi$ interaction between B and F in BF_3 whereas there is no possibility of such interaction between C and F in CF_4
- D. lower degree of $p\pi - p\pi$ interaction between B and F in BF_3 than that between C and F in CF_4 .

Answer:



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16. Boron cannot form which one of the following anions ?



Answer:



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17. Which of the following exists as covalent crystals in the solid state?

A. Phosphate

B. Iodine

C. Silicone

D. Sulphur

Answer:



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18. Match the items in Column-I with its main use listed in

Column-II :

Column-I		Column-II	
(I)	Silica gel	(p)	Transistor
(II)	Silicon	(q)	Ion-exchanger
(III)	Silicone	(r)	Drying agent
(IV)	Silicate	(s)	Sealant

A. (I)-(r), (II)-(p), (III)-(s), (IV)-(q)

B. (I)-(s), (II)-(p), (III)-(q), (IV)-[®]

C. (I)-(q), (II)-(s), (III)-(p), (IV)-[®]

D. (I)-(q), (II)-(p), (III)-(s), (IV)-[®]

Answer:



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19. Assertion : Among the carbon allotropes, diamond is an insulator, wherea, graphite is a good conductor of electricity.

Reason : Hybridization of carbon in diamond and graphite are sp^3 and sp^2 , respectively.

A. Both assertion and reason are correct, and the reason is the correct explanation for the assertion.

- B. Both assertion and reason are correct, but the reason is not the correct explanation for the assertion.
- C. Assertion is incorrect statement, but the reason is correct.
- D. Both assertion and reason are incorrect.

Answer:



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20. The number of 2-centre-2-electron and 3-centre-2-electron bonds in B_2H_6 , respectively, are

- A. 2 and 1
- B. 4 and 2

C. 2 and 2

D. 2 and 4

Answer:



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21. Aluminium is usually found in $+3$ oxidation state. In contrast, thallium exists in $+1$ and $+3$ oxidation states.

This is due to:

A. diagonal relationship

B. lanthanoid contraction

C. inert pair effect

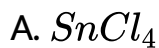
D. lattice effect

Answer:



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22. The chloride that CANNOT get hydrolysed is :



Answer:



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23. The element that does NOT show catenation is :

A. Si

B. Pb

C. Sn

D. Ge

Answer:



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24. $p\pi - p\pi$ multiple bond is seen in

A. Si

B. conversion of white tin to grey tin

C. gel

D. Sn

Answer:



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25. The relative stability of $+1$ oxidation state of group 13 elements follow the order :

A. Tl > In > Ga > Al

B. Al > Ga > Tl > In

C. Ga > Al > In > Tl

D. Al > Ga > In > Tl

Answer:



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26. Correct statements among a to d regarding silicones are :

- (a) They are polymers with hydrophobic character.
- (b) They are biocompatible.
- (c) In general, they have high thermal stability and low dielectric strength.
- (d) Usually, they are resistant to oxidation and used as greases.

A. They are polymers with hydrophobic character(a), (b),
(c) and (d)

B. They are biocompatible(a), (b) and (d) only

C. (a) and (b) only

D. (a), (b) and (c) only

Answer:



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27. The order of catenation power is

A. $C > Sn > S \approx Ge$

B. $Ge > Sn > Si > C$

C. $Si > Sn > C > Ge$

D. $C > Si > Ge \approx Sn$

Answer:



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28. C_{60} an allotrope of carbon contains

- A. 12 hexagons and 20 pentagons
- B. 16 hexagons and 16 pentagons
- C. 20 hexagons and 12 pentagons
- D. 18 hexagons and 14 pentagons

Answer:



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29. B_2H_6 reacts with O_2 and H_2O respectively to form?

A. HBO_2 and H_3BO_3

B. B_2O_3 and H_3BO_3

C. B_2O_3 and $[BH_4]^-$

D. H_3BO_3 and B_2O_3

Answer:



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30. The C—C bond length is maximum in :

(a) C_{60}

(b) diamond

(c) C_{70}

(d) All of these

A. C_{60}

B. graphite

C. C_{70}

D. diamond

Answer:



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31. No. Of pentagons in C_{60} and Triangles in white Phosphorus are :

A. 12 and 4

B. 20 and 3

C. 12 and 3

D. 20 and 4

Answer:



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32. The correct statements among I to III regarding group 13 element oxides are,

(I) Boron trioxide is acidic.

(II) Oxides of aluminium and gallium are amphoteric.

(III) Oxides of indium and thallium are basic.

A. (I), (II) and (III)

- B. (I) and (II) only
- C. (II) and (III) only
- D. (I) and (III) only

Answer:



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33. The amorphous form of silica is

- A. tridymite
- B. kieselguhr
- C. cristobalite
- D. quartz

Answer:



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34. The reaction of $H_3N_3B_3Cl_3$ (A) with $LiBH_4$ in tetrahydrofuran gives inorganic benzene (B). Further, the reaction of (A) with (C) leads to $H_3N_3B_3(Me)_3$. Compounds (B) and (C) respectively, are :

- A. Borazine and $MeMgBr$
- B. Diborane and $MeMgBr$
- C. Borazine and $MeBr$
- D. Boron nitride and $MeBr$

Answer:



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1. Carbon acts as an abrasive and also as a lubricant, explain.



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2. Moderate electrical conductivity is shown by

A. silica

B. graphite

C. diamond

D. None of the above

Answer:



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3. Give reason for the following in one or two sentences :

"Solid carbon dioxide is known as dry ice."



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4. Carbon tetrachloride burns in air when lighted to give phosgene.



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5. Give reasons

Graphite is used as lubricant.



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6. Graphite is used as a lubricant in machinery.



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7. All the $Al - Cl$ bonds in Al_2Cl_6 are equivalent.



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8. Each entry in column X is in some way related to the entries in column and Z. Match the appropriate entries.

columns Y and Z. Match the appropriate entries.

X	Y	Z
Yeast	Fermentation	Ethanol
Mica	Graphite	Abrasive
Superphosphate	Crystalline cubic	Insulator
Carbon fibres	Layer structure	Fertiliser
Rock salt	Diamond structure	Reinforced plastics
Carborundum	Bone ash	Preservative



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9. Write the balanced equation for the preparation of crystalline silicon from $SiCl_4$.



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10. The hydrolysis of alkyl substituted chlorosilanes gives _____.



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11. The tendency for catenation is much higher for C than for Si.



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12. The basic nature of the hydroxides of group 13 decreases progressively down the group.(T/F)



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13. Diamond is



Watch Video Solution

14. One recently discovered allotrope of carbon (*e. g.* C_{60}) is commonly known as,



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15. The hydrolysis of trialkylchlorosilane , R_3SiCl , yields,



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16. Which of the following oxides is neutral ?

A. CO

B. SnO_2

C. ZnO

D. SiO_2

Answer:



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17. Which of the following halides is least stable and has doubtful existence ?

A. CCl_4

B. GeI_4

C. SnI_4

D. PbI_4

Answer:



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18. Aluminium sulphide gives a foul odour when it becomes damp. Write a balanced chemical equation for the reaction.



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19. Anhydrous $AlCl_3$ is covalent from the data given below, predict whether it would remain covalent or become ionic

in aqueous solution

$$IE_1 \text{ of } Al = 5140 \text{ kJ mol}^{-1}$$

$$\Delta_{\text{hyd}} H^\ominus (Al^{3+}) = -4665 \text{ kJ mol}^{-1}$$

$$\Delta_{\text{hyd}} H^\ominus (Cl^\ominus) = -380 \text{ kJ mol}^{-1}$$



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20. A liquid which is permanently supercooled is frequently called a



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21. Statement-1 : $Al(OH)_3$ is amphoteric in nature.

Statement-2 : It cannot be used as an antacid.

- A. Statement-1 is True, Statement-2 is True and Statement-2 is a correct explanation for Statement-1
- B. Statement-1 is True, Statement-2 is True and 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

Answer:



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22. Draw the structure of a cyclic silicate, $(Si_3O_9)^{6-}$ with proper labelling.

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23. In compounds of type ECl_3 , where $E = BP, As$ or B , the angles $Cl - E - Cl$ for different E are in the order

A. $B < P = As = Bi$

B. $B > P > As > Bi$

C. $B > P = As = Bi$

D. $B < P < As < Bi$

Answer:

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24. Assertion : Among SiCl_4 and CCl_4 only SiCl_4 reacts with water.

Reason : SiCl_4 is ionic and CCl_4 is covalent .

A. Statement-1 is True, Statement-2 is True and

Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True and

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

Answer:



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25. Compound X on reduction with $LiAlH_4$ gives a hydride Y containing 21.72% hydrogen and other products. The compound Y reacts with air explosively resulting in boron trioxide. What are X and Y respectively ?



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26. How is boron obtained from borax ? Give chemical equations with reaction conditions.



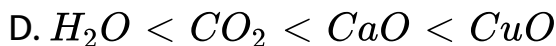
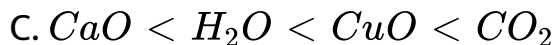
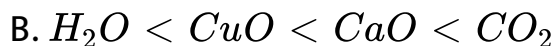
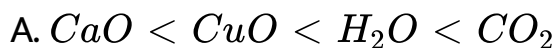
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27. Write the structure of B_2H_6 and its reaction with HCl (excess).



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28. The correct order of acidic strength of the following is

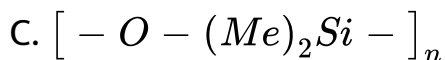
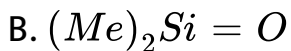
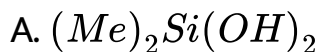


Answer:



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29. Me_2SiCl_2 on hydrolysis will produce



Answer:



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30. Aluminium trifluoride is insoluble in anhydrous HF but dissolves on addition of NaF. Aluminium trifluoride

precipitates out of the resulting solution when gaseous BF_3 is bubbled through. Give reasons.



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31. Name the type of the structure of silicate in which one oxygen atom of $[SiO_4]^{4-}$ is shared ?

- A. pyrosilicate
- B. sheet silicate
- C. linear chain silicate
- D. three-dimensional silicate

Answer:



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32. Starting from $SiCl_4$ prepare the following in steps not exceeding the number give in parantheses (give reaction only)

a. Silicon (1)

b. Linear silicone containing methyl groups only (4)

c. Na_2SiO_3 (3).



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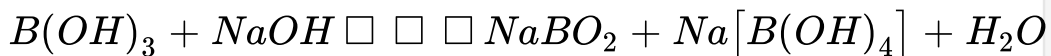
33. Match the following :

Column-I		Column-II	
(A)	$B_2^{3+} \longrightarrow B_2O^{+}$	(p)	Heat
(B)	$[AlO_2]^- \longrightarrow Al(OH)_3$	(q)	Hydrolysis
(C)	$SiO_4^{4-} \longrightarrow Si_2O_7^{6-}$	(r)	Acidification
(D)	$B_4O_7^{2-} \longrightarrow B(OH)_3$	(s)	Dilution by water



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34.



How can this reaction is made to proceed in forward direction?

- A. Addition of cis 1, 2-diol
- B. Addition of borax
- C. Addition of trans 1, 2-diol
- D. Addition of Na_2HPO_4

Answer:



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35. Assertion : Boron forms only covalent compounds. ,

Reason : Boron has very small size.

A. Statement-1 is True, Statement-2 is True and

Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True and

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

Answer:



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36. Statement I In water, orthoboric acid behaves as a weak monobasic acid.

Statement II In water, orthoboric acid acts as a proton donor.

A. Statement-1 is True, Statement-2 is True and

Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True and

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

Answer:



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37. H_3BO_3 is :

- A. monobasic and weak Lewis acid
- B. monobasic and weak Bronsted acid
- C. monobasic and strong Lewis acid
- D. tribasic and weak Bronsted acidq

Answer:



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38. Statement I: Pb^{4+} compounds are stronger oxidizing agents than Sn^{4+} compounds.

Statement II: The higher oxidation states for the group 14 elements are more stable for the heavier members of the group due to 'inert pair effect'.

A. Statement-1 is True, Statement-2 is True and

Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True and

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

Answer:

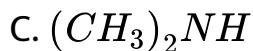
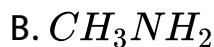


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39. In the reaction.



X cannot be



Answer:



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40. The value of n in the molecular formula $Be_nAl_2Si_6O_{18}$ is



41. With respect to graphite and diamond, which of the statements given below are correct?

(1) Graphite is harder than diamond.

(2) Graphite has higher electrical conductivity than diamond.

(3) Graphite has higher thermal conductivity than diamond.

(4) Graphite has higher $C - C$ bond order than diamond.

A. Graphite is harder than diamond

B. Graphite has higher electrical conductivity than diamond

C. Graphite has higher thermal conductivity than diamond

D. Graphite has higher $C - C$ bond order than diamond

Answer:



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42. The correct statement (s) for orthoboric acid is/are

A. It behaves as a weak acid in water due to self ionization

B. Acidity of its aqueous solution increases upon addition of ethylene glycol

C. It has a three-dimensional structure due to hydrogen bonding

D. It is a weak electrolyte in water

Answer:



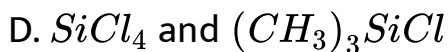
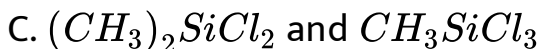
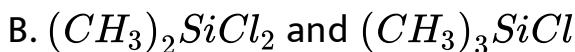
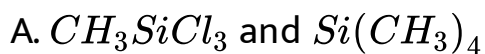
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43. Three moles of B_2H_6 are completely reacted with methanol. The number of moles of boron containing product formed is.



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44. Under hydrolytic conditions, the compounds used for preparation of linear polymer and for chain termination, respectively, are



Answer:



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45. The correct order of atomic radii in group 13 elements is

A. Al It Ga It In It Tl

B. Ga It Al It In It Tl

C. Al It In It Ga It Tl

D. Al It Ga It Tl It In

Answer:



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46. The crystalline form of borax has

A. tetranuclear $[B_4O_5(OH)_4]^{2-}$ unit

B. all boron atoms in the same plane

C. equal number of sp^2 and sp^3 hybridized boron atoms

D. one terminal hydroxide per boron atom

Answer:



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47. Among the following, correct statement is :

A. $Al(CH_3)_3$ has the three – centre two-electron bonds

in its dimeric structure

B. BH_3 has the three-centre two-electron bonds in its

dimeric structure

C. $AlCl_3$ has the three-centre two-electron bonds in its

dimeric structure

D. The Lewis acidity of BCl_3 is greater than that of $AlCl_3$

Answer:



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48. A tin chloride Q undergoes the following reaction (not balanced) $Q + Cl^- \rightarrow X$ $Q + Me_3N \rightarrow Y$ $Q + CuCl_2 \rightarrow Z + CuCl$ X is monoanion having pyramidal geometry. Both Y and Z are neutral compounds. Choose the correct option(s)

- A. The central atom in Z has one lone pair of electrons
- B. The oxidation state of the central atom in Z is +2
- C. The central atom in X is sp^3 hybridized

D. There is a coordinate bond Y

Answer:



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