

The p-Block Elements

Question 1.

Consider the following statement about Ozone I. O_3 is formed by the interaction of fluorine. II. It turns tetramethyl base paper as violet. III. It turns benzidine paper as brown. The correct set of true statement is

- (a) I and II
- (b) I, II and III
- (c) I and III
- (d) II and III

▼ Answer

Answer: (b) I, II and III

Explanation:

Ozone is formed by the interaction of fluorine. It turns tetramethyl base paper and benzidine paper as violet and brown respectively.

Hence, the correction option is (2).

Question 2.

In the compound of type ECl_3 , where E = B, P, As, or Bi, the angle 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

Answer: (b) B > P > As > Bi

Explanation:

BCl_3 is trigonal planar in structure and bond angles are 120° each. PCl_3 , $AsCl_3$, and $BiCl_3$ are pyramidal in shape with sp^3 -hybridization.

In all of them, the bond angles are less than the normal tetrahedral angle of 109.28° , and also these bond angles decrease down the group.

Therefore, the correct order of bond angles is as follows:

B > P > As > Bi

Question 3.

In white phosphorous(P_4) molecule, which one is not correct:

- (a) 6P-P single bonds are present
- (b) 4P-P single bonds are present
- (c) 4 lone pair of electrons is present
- (d) P-P-P bond angle is 60°

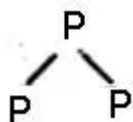
▼ Answer

Answer: (a) 6P-P single bonds are present

Explanation:

It has total four lone pairs of electrons situated at each P – atom.

It has six P_P single bond



Question 4.

All the elements of oxygen family are

- (a) Non metals
- (b) Metalloids
- (c) Radioactive
- (d) Polymorphic

▼ Answer

Answer: (d) Polymorphic

Explanation:

Group 16 elements are called polymorphic elements because all elements show allotropy except Te.

Question 5.

Which of the following will not produce hydrogen gas ?

- (a) Reaction between Fe and dil. HCl
- (b) Reaction between Zn and NaOH
- (c) Reaction between Zn and conc. H_2SO_4
- (d) Electrolysis of NaCl in Nelsons cell

▼ Answer

Answer: (c) Reaction between Zn and conc. H_2SO_4

Explanation:

Concentrated sulphuric acid reacts with Zn to give SO_2 and not H_2

Question 6.

Amorphous form of Silica is

- (a) Tridymite
- (b) Kieselguhr
- (c) Cristobalite
- (d) Quartz

▼ Answer

Answer: (c) Cristobalite

Explanation:

Silicon Dioxide/ Silica/ Quartz –

Covalent, three dimensional solid network in which each silicon is covalently bond to four oxygen atoms (sp^3 hybridisation) forming a tetrahedral structure.

Function of quartz –

As piezoelectric material in clocks, radio, television broadcasting and mobile communication.

Quartz, tridymite, cristobalite is crystalline form, and kieselguhr is an amorphous form of silica.

Question 7.

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

- (a) Has carbon atoms arranged in large plates of rings of strongly bound carbon atoms with weak interplate bonds
- (b) Is a non – crystalline substance
- (c) Is an allotropic form of carbon
- (d) Has molecules of variable molecular masses like polymers.

▼ Answer

Answer: (a) Has carbon atoms arranged in large plates of rings of strongly bound carbon atoms with weak interplate bonds

Explanation:

C-atoms of graphite form covalently bonded plates (layers). These layers are held together by weak forces of attraction. i.e., one layer can slide over other to cause lubricacy. It cannot be melted easily as a large number of atoms being bonded strongly in the layer to form big entity.

Question 8.

Borax is used as a cleansing agent because on dissolving in water, it gives

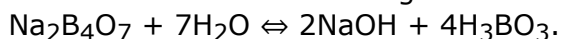
- (a) Alkaline solution
- (b) Acidic solution
- (c) Bleaching solution
- (d) Amphoteric solution.

▼ Answer

Answer: (a) Alkaline solution

Explanation:

Borax dissolves in water to give an alkaline solution.



Question 9.

Among the C-X bond (where, X = Cl, Br, I) the correct decreasing order of bond energy is

- (a) C-I > C-Cl > C-Br
- (b) C-I > C-Br > C-Cl
- (c) C-Cl > C-Br > C-I
- (d) C-Br > C-Cl > C-I

▼ Answer

Answer: (c) C-Cl > C-Br > C-I

Explanation:

Among the C-X bond (where, X = Cl, Br, I), the correct decreasing order of bond energy is C-Cl > C-Br > C-I

Question 10.

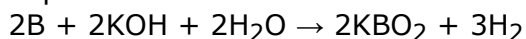
On heating boron with caustic potash, the pair of products formed are

- (a) Potassium Borate + Dihydrogen
- (b) Potassium Borate + Water
- (c) Potassium Borate + H₂
- (d) Borax + Dihydrogen.

▼ Answer

Answer: (a) Potassium Borate + Dihydrogen

Explanation:



Boron reacts with potassium hydroxide and water to produce potassium metaborate and hydrogen.

Question 11.

Which of the following statements regarding ozone is not correct?

- (a) The oxygen-oxygen bond length in ozone is identical with that of molecular oxygen
- (b) The ozone is resonance hybrid of two structures
- (c) The ozone molecule is angular in shape
- (d) Ozone is used as a germicide and disinfectant for the purification of air.

▼ Answer

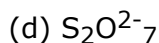
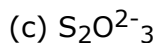
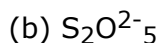
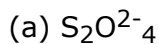
Answer: (a) The oxygen-oxygen bond length in ozone is identical with that of molecular oxygen

Explanation:

The oxygen-oxygen bond length in ozone is identical with that of molecular oxygen

Question 12.

There is no S-S bond in

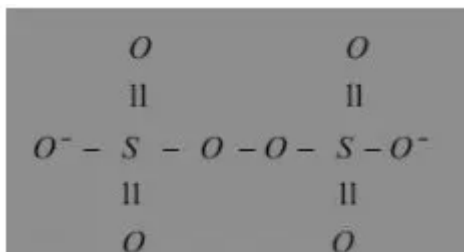


▼ Answer

Answer: (d) $\text{S}_2\text{O}_7^{2-}$

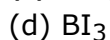
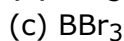
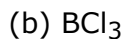
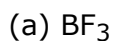
Solution :

There is no S-S bond in $\text{S}_2\text{O}_7^{2-}$



Question 13.

Which is strongest Lewis acid?



▼ Answer

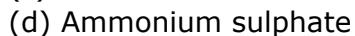
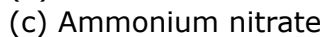
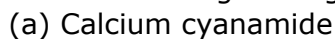
Answer: (a) BF_3

Explanation:

Larger the size of halogen atom less is the back donation of electrons into empty 2p orbital of B.

Question 14.

Fertilizer having the highest nitrogen percentage is:



▼ Answer

Answer: (b) Urea

Explanation:

Every compound has 2N atoms (i.e., same mass of N), thus compound with the lowest molecular mass (i.e., urea) will have the highest N percentage.

Question 15.

In general, the Boron Trihalides act as

- (a) Strong reducing agent
- (b) Lewis Acids
- (c) Lewis Bases
- (d) Dehydrating Agents

▼ [Answer](#)

Answer: (b) Lewis Acids

Explanation:

The boron atom in trihalides has only six electrons in the valence shell and hence can accept a pair of electrons in the vacant p-orbital to complete its octet. As a result, boron trihalides act as a Lewis acids.

Question 16.

Which of the following is not a mineral of boron?

- (a) Colemanite
- (b) Kernite
- (c) Boric Anhydride
- (d) Borax

▼ [Answer](#)

Answer: (c) Boric Anhydride

Explanation:

The most important boron minerals in commercial terms are; Tincal, Colemanite, Kernite, Ulexite, Pandermite, Boracite, Szaybelite and Hydroboracite. The main boron minerals transformed by Eti Maden, the World Boron Leader, into high value added products in international quality standards are; Tincal, Colemanite and Ulexite.

Question 17.

Which phosphorus is used as a rat poison?

- (a) White
- (b) Violet
- (c) Red
- (d) Black

▼ [Answer](#)

Answer: (a) White

Explanation:

White phosphorous is least stable and most toxic of all allotropes. Upon coming on contact with air it is toxic and causes severe liver damage on digestion so it is used as rat poison.

Question 18.

The structure of diBorane contains

- (a) Four 2c – 2e bonds and two 3c – 2e bonds
- (b) Two 2c – 2e bonds and two 3c – 2e bonds
- (c) Two 2c – 2e bonds and two 3c – 3e bonds
- (d) Four 2c – 2e bonds and four 3c – 2e bonds

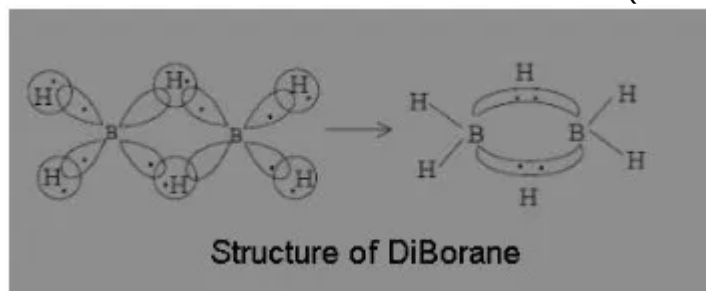
▼ [Answer](#)

Answer: (a) Four 2c – 2e bonds and two 3c – 2e bonds

Explanation:

According to molecular orbital theory, each of the two boron atoms is in sp^3 hybrid state. Of the

four hybrid orbitals, three have one electron each while the fourth is empty. Two of the four orbitals of each of the boron atom overlap with two terminal hydrogen atoms forming two normal B – H σ -bonds. One of the remaining hybrid orbital (either filled or empty) of one of the boron atoms, 1s orbital of hydrogen atoms (bridge atom) and one of hybrid orbitals of the other boron atom overlap to form a delocalised orbital covering the three nuclei with a pair of electrons. Such a bond is known as three centre two electron (3c – 2e) bonds



Question 19.

Nitrogen (I) oxide is produced by:

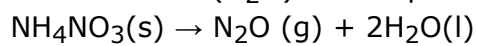
- (a) Thermal decomposition of ammonium nitrate
- (b) Disproportionation of N_2O_4
- (c) Thermal decomposition of ammonium nitrite
- (d) None of the above

▼ [Answer](#)

Answer: (c) Thermal decomposition of ammonium nitrite

Explanation:

Nitrous Oxide (N_2O) can be produced by thermal decomposition of ammonium nitrate:



Question 20.

Red phosphorus is chemically less reactive because

- (a) It does not contain P – P bonds
- (b) It does not contain tetrahedral P_4 molecules
- (c) It does not catch fire in air even upto 400°C
- (d) It has a polymeric structure

▼ [Answer](#)

Answer: (d) It has a polymeric structure

Explanation:

Red phosphorus is less reactive because of its giant polymeric structure.
