#423102

Topic: Fundamentals of chemical bonding

Explain the formation of a chemical bond.

Solution

The attractive force which holds together the constituent particles (atoms, ions or molecules) in a chemical species is known as chemical bond.

Atoms either share or gain or lose electrons to attain stable electronic configuration. Due to this, a state of minimum energy is obtained and chemical bond is formed. This results in maximum stability. When two atoms share electrons, covalent bond is formed and when atoms lose or gain electrons, ionic bond is formed.

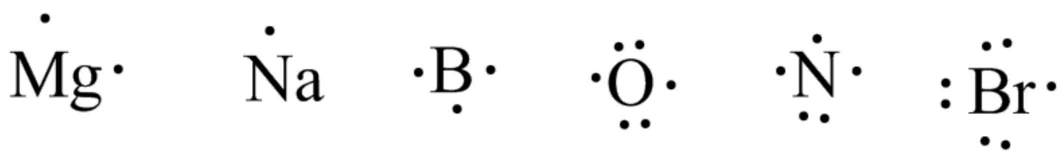
#423103

Topic: Fundamentals of chemical bonding

Write Lewis dot symbols for atoms of the following elements: Mg, Na, B, O, N and Br.

Solution

The correct lewis symbols are shown below.



#423105

Topic: Fundamentals of chemical bonding

Write Lewis symbols for the following atoms and ions.

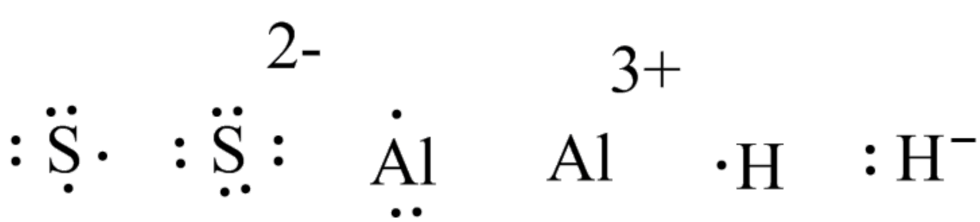
(i) S and S^{2-},

(ii) Al and Al^{+3}, and

(iii) H and H^-

Solution

The lewis symbols are shown below.



#423106

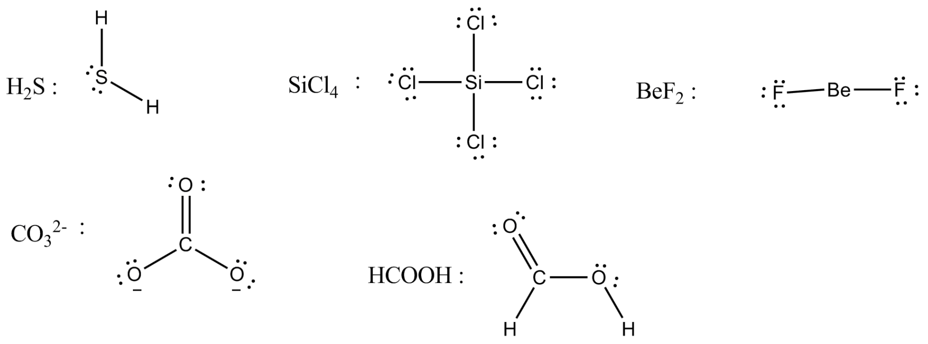
Topic: Fundamentals of chemical bonding

Draw the Lewis structures for the following molecules and ions.

$H_2S,\ SiCl_4,\ BeF_2,\ CO_3^{2-}$ and $HCOOH$

Solution

The lewis structures are shown below.



#423107

Topic: Covalent compounds

Define octet rule and write its significance and limitations.

Solution

To complete the octet in the valence shell, the atoms either share the valence electrons or gain or lose valence electrons. This is known as octet rule.

Significance: It explains the reason behind the chemical combination of different atoms to form ionic or covalent bond.

Limitations :

(1) Hydrogen with 1 electron attains stability by sharing, gaining or losing 1 valence electron. It does not need to complete octet to attain stability. Also, He has only 2 electrons and is stable.

(2) Incomplete octet: In certain molecules such as $LiCl,\ BeH_2,\ BeCl_2,\ BH_3,\ BF_3$, the central atom has less than 8 electrons in its valence shell, yet the molecule is stable.

(3) Expanded octet: In certain molecules such as $PF_5,\ SF_6,\ IF_7,\ H_2SO_4$, the central atom has more than 8 valence electrons, yet the molecule is stable.

#423108

Topic: Ionic or electrovalent compounds

Write the favourable factors for the formation of ionic bond.

Solution

1) Two atoms must be different.

2) Ionization potential of one atom must be small.

3) Electron affinity of second atom must be high.

4) Electro negativity of second atom must be high.

5) Difference of E.N. between two will be greater than or equal to 1.7.

#423110

Topic: VSEPR Theory

Determine the shape of the following molecules using the VSEPR model.

$BeCl_2,\ BCl_3,\ SiCl_4,\ AsF_5,\ H_2S,\ PH_3$

Solution

The shape according to VSEPR theory is given below.

Molecule	Number of electron pairs around central atom	Molecular geometry	Bond angles
$BeCl_2$	2	Linear	180^o
BCl_3	3	trigonal planar	120^o
$SiCl_4$	4	tetrahedral	109.5^o
AsF_5	5	trigonal bipyramidal	three 120^o, two 90^o
H_2S	6	octahedral	90^o
PH_3	5	trigonal bipyramidal	93.5^o

#423111
Topic: Hybridisation

Although geometries of NH_3 and H_2O molecules are distorted tetrahedral, bond angle in water is less than that of ammonia. Discuss.

Solution

The central atom in ammonia and water molecules have1 and 2 lone pairs of electrons respectively.

Lone pairs distort the molecular geometry. $Lp-bp$repulsion is stronger than bp-bp repulsion. The bond angle of ammonia reduces from 109.5^o (tetrahedral) to 107^o.

In case of water molecule, the bond angle decreases to 105.4^o as more number of lp-bp repulsions are present.

#423112
Topic: Valence bond theory

How is the bond strength related to the bond order?

Solution

Greater is the bond order, smaller is the bond length. As the bond order increases, the bond strength increases while bond length decreases.

#423113
Topic: Valence bond theory

Define bond length in a molecule.

Solution

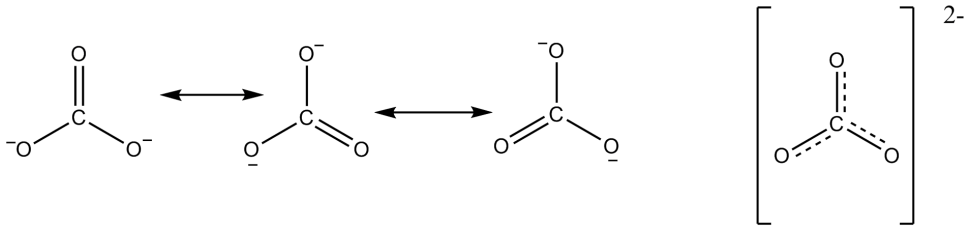
The average distance between the centres of the nuclei of two bonded atoms in a molecule is called bond length. Bond length is the equilibrium inter-nuclear separation distance of the bonded atoms in a molecule.

#423115
Topic: Resonance

Explain the important aspects of resonance with reference to the CO_3^{2-} ion.

Solution

The carbonate ion cannot be represented by one single structure but its properties can be described by two or more resonance structures . The actual structure of carbonate ion is the resonance hybrid of the contributing structures. In the resonance hybrid, all the three bond lengths are equal and the bonds are intermediate between single and double bonds.

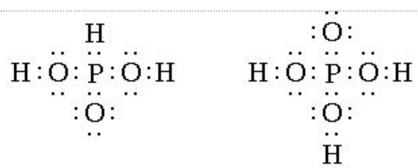


Contributing structures

Resonance hybrid

#423116

Topic: Resonance



H_3PO_3 can be represented by structures 1 and 2 shown above. Can these two structures be taken as the canonical forms of the resonance hybrid representing H_3PO_3 ? If not, give reasons for the same.

Solution

In the canonical forms, the position of atoms remains same but the position of electrons change. In the given canonical forms, the position of atoms changes. Hence, they cannot be taken as canonical forms.

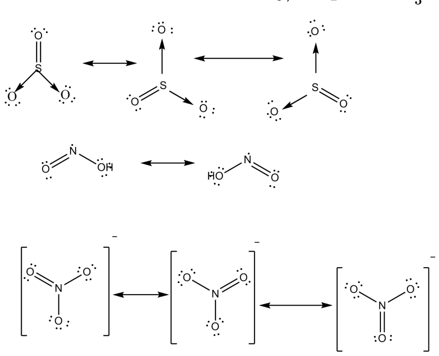
#423118

Topic: Resonance

Write the resonance structures for SO_3, NO_2 and $NO_3{}^-$.

Solution

The resonance structures for SO_3, NO_2 and NO_3^- are shown above.



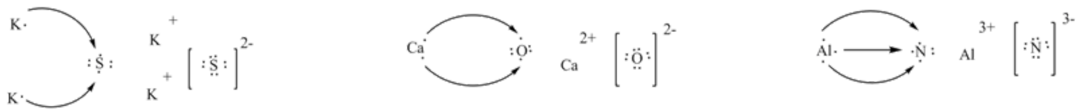
#423122

Topic: Fundamentals of chemical bonding

Use Lewis symbols to show electron transfer between the following atoms to form cations and anions: (a) K and S (b) Ca and O (c) Al and N.

Solution

The Lewis symbols are shown below. Metal atom loses one or more electrons to form cation and non metal atom gains one or more electrons to form anion. Cations and anions form ionic bonds.



#423123

Topic: Hybridisation

Although both CO_2 and H_2O are triatomic molecules, the shape of H_2O molecule is bent while that of CO_2 is linear. Explain this on the basis of dipole moment.

Solution

CO_2 molecule with zero dipole moment is linear as two $C=O$ bond dipoles cancel each other. The net dipole moment of water molecule is non-zero which indicates that the water molecule is non-linear. Two $O-H$ bonds form angular shape.

#423125

Topic: Dipole moment

Write the significance/application of dipole moment.

Solution

Significance/ application of dipole moment:

(i) Distinction between polar and non polar molecules:

Non polar molecules such has nitrogen, oxygen and hydrogen have zero dipole moment whereas polar molecules have non zero dipole moment. For example, the dipole moment of water, HF, HCl and H_2S are 1.85D, 1.78D, 1.07D and 0.95 D respectively.

(ii) Degree of polarity in a molecule: Greater is the value of dipole moment, greater is the degree of polarity. This relationship specially holds true for diatomic molecules. HF (1.78D) is more polar than HCl (1.07D).

(iii) Shapes of molecules:

Water and carbon dioxide have dipole moments 1.85 D and 0 respectively.

Thus, water has angular shape whereas carbon dioxide has linear shape.

(iv) Ionic character in a molecule.

The percentage ionic character is the ratio of observed dipole moment to dipole moment for complete ionic character multiplied by 100.

#423128

Topic: Valence bond theory

Explain the polar covalent bond with the help of suitable example.

Solution

Polar covalent bond is formed between the atoms having different electronegativities. The bonds in $HCl, HF, BrCl$ and H_2O are polar covalent bonds. The polarity of the bond is directly proportional to the electronegativity difference.

#423131

Topic: Dipole moment

Arrange the below molecules in order of increasing ionic character.

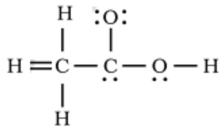
LiF , K_2O, N_2, SO_2 and ClF_3

Solution

The increasing order of ionic character is $N_2 < SO_2 < ClF_3 < K_2O < LiF$ As the electronegativity difference increases, the ionic character increases.

#423134

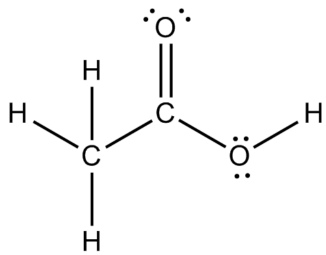
Topic: Fundamentals of chemical bonding



The skeletal structure of CH_3COOH as shown above is correct but some of the bonds are shown incorrectly. Write the correct Lewis structure for acetic acid.

Solution

The correct Lewis structure for acetic acid is shown below.



Acetic acid

#423137
Topic: Hybridisation

Apart from tetrahedral geometry, another possible geometry of CH_4 could be square planar with the four H atoms at the corners of the square and the C atom at its centre. Why CH_4 is not square planar?

Solution

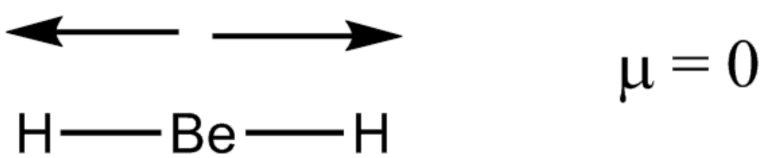
The square planar geometry has a bond angle of 90^0. This is lesser than the tetrahedral bond angle which is 109.5^0. Due to this, in the square planar geometry, the repulsive forces are more and hence, square planar geometry is less stable.

#423138
Topic: Dipole moment

Explain why BeH_2 molecule has a zero dipole moment although the $Be-H$ bonds are polar.

Solution

In the linear BeH_2 molecule, the resultant dipole moment of two $Be-H$ bonds cancel each other. Due to this, the over all dipole moment of the molecule is zero.



#423140
Topic: Dipole moment

Which out of NH_3 and NF_3 has higher dipole moment and why?

Solution

The dipole moment of ammonia $(1.47D)$ is higher than the dipole moment of NF_3 $(0.24D)$. The molecular geometry is pyramidal for both the molecules. In each molecule, N atom has one lone pair. F is more electronegative than H and $N-F$ bond is more polar than $N-H$ bond. Hence, NF_3 is expected to have much larger dipole moment than NH_3. However reverse is true as in case of ammonia, the direction of the lone pair dipole moment and the bond pair dipole moment is same whereas in case of NF_3 it is opposite. Thus, in ammonia molecule, individual dipole moment vectors add whereas in NF_3, they cancel each other.

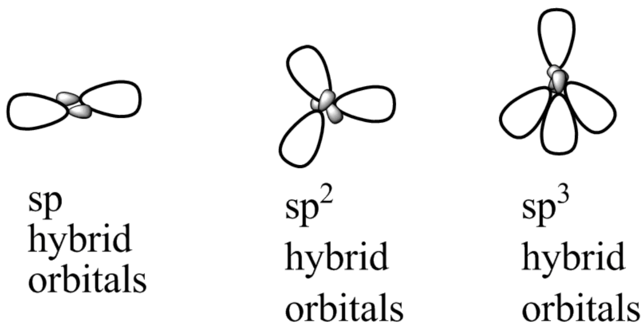
#423141
Topic: Hybridisation

What is meant by hybridisation of atomic orbitals? Describe the shapes of sp, sp^2, sp^3 hybrid orbitals.

Solution

The process of intermixing of the orbitals of slightly different energies so as to redistribute their energies resulting in the formation of new set of orbitals of equivalent energies and shapes.

The new orbitals are called hybrid (or hybridized) orbitals. Thus, one s orbital and one p orbital combines to form $2sp$ hybrid orbitals of equivalent shapes and energies. The shapes of sp, sp^2 and sp^3 hybrid orbitals are linear, trigonal planar and tetrahedral respectively.



#423144

Topic: Hybridisation

Describe the change in hybridisation (if any) of the Al atom in the following reaction.

$AlCl_3 + Cl^- \rightarrow AlCl_4{}^-$

Solution

The hybridization of Al atom changes from sp^2 in $AlCl_3$ to sp^3 in $AlCl_4{}^-$. In $AlCl_3$, Al contains 3 bond pairs of electrons and zero lone pair of electrons. Hence, it is sp^2 hybridized. In $AlCl_4{}^-$, Al atom contains 4 bond pairs of electrons and zero lone pairs of electrons. Hence, it is sp^3 hybridized.

#423145

Topic: Hybridisation

Is there any change in the hybridisation of B and N atoms as a result of the following reaction?

$BF_3 + NH_3 \rightarrow F_3B.NH_3$

Solution

The hybridization of B changes from sp^2 to sp^3 whereas the hybridization of N remains same i.e sp^3.

#423146

Topic: Valence bond theory

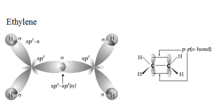
Draw diagrams showing the formation of a double bond and a triple bond between carbon atoms in C_2H_4 and C_2H_2 molecules.

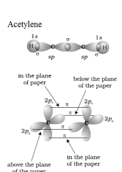
Solution

In ethylene, the carbon atom is sp^2 hybridized.

In acetylene, the carbon atom is sp hybridized.

The energy level diagrams of ethylene and acetylene are shown below.





#423147

Topic: Hybridisation

What is the total number of sigma and pi bonds in the following molecules?

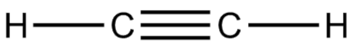
(a) C_2H_2

(b) C_2H_4

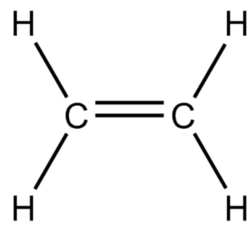
Solution

(a) Acetylene C_2H_2 contains 3σ bonds and 2π bonds. Total number of bonds $= 3+2=5$

(b) Ethylene C_2H_4 contains 5σ bonds and 1π bond. Total number of bonds $= 5+1=6$



Acetylene



Ethylene

#423149

Topic: Valence bond theory

Considering $x-$axis as the internuclear axis, the overlap of which of the following orbitals will not form a sigma bond and why?

(a) $1s$ and $2s$

(b) $1s$ and $2p_x$

(c) $2p_y$ and $2p_y$

(d) $1s$ and $2s$

Solution

The combination c will not result in the formation of sigma bond as it will result in sideways overlap.

This will result in the formation of π bond. In the options a, b and d, sigma bond will be formed.

#423156

Topic: Hybridisation

Which hybrid orbitals are used by carbon atoms in the following molecules?

$(a)CH_3-CH_3; (b)CH_3-CH=CH_2; (c)CH_3-CH_2-OH; (d)CH_3-CHO; (e)CH_3COOH$

Solution

$(a)CH_3-CH_3$

Both the carbon atoms are sp^3 hybridized.

$(b)CH_3-CH=CH_2$

The carbon atom of methyl group is sp^3 hybridized whereas other two carbon atoms are sp^2 hybridized.

$(c)CH_3-CH_2-OH$

Both the carbon atoms are sp^3 hybridized.

$(d)CH_3-CHO$

The carbon atom of methyl group is sp^3 hybridized whereas the other carbon atom is sp^2 hybridized.

$(e)CH_3COOH$

The carbon atom of methyl group is sp^3 hybridized whereas the other carbon atom is sp hybridized.

#423158

Topic: Covalent compounds

What do you understand by bond pairs and lone pairs of electrons? Illustrate by giving one example of each type.

Solution

Two atoms share one electron each to form a covalent bond.

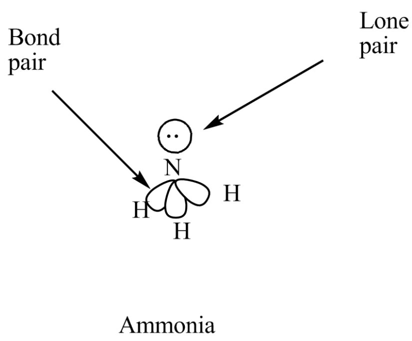
The electrons present in the covalent bond are known as bond pair of electrons.

For example, in methane, there are four C-H covalent bonds.

Thus, in methane molecule, four bond pairs of electrons are present.

The electron pairs left in the valence shell without forming the bond are known as lone pairs of electrons.

For example, ammonia molecule has one lone pair of electrons and water molecule has two lone pairs of electrons.



#423159
Topic: Valence bond theory

Distinguish between a sigma and a pi bond.

Solution

Sigma bond	Pi bond
(1) Coaxial overlap results in the formation of sigma bond.	(1) Lateral overlap results in the formation of pi bond.
(2) Extent of overlap is larger which results in formation of stronger bond.	(2) Extent of overlap is smaller which results in formation of weaker bond.
(3) The molecular orbital is continuous. It has symmetry around the internuclear axis.	(3) The molecular orbital is discontinuous and posses two charge clouds above and below the internuclear axis.
(4) Free rotation of atoms about sigma bond is possible.	(4) Free rotation of atoms about pi bond is not possible.

#423160
Topic: Valence bond theory

Explain the formation of H_2 molecule on the basis of valence bond theory.

Solution

The elecronic confguration of hydrogen is $1s^1$.

Thus, it contains one unpaired electron in 1s orbital. Two H atoms, each having one unpaired electron, combine and share their electron to form a covalent bond in which two electrons are paired.

$H\cdot + H\cdot \rightarrow H\cdot\cdot H$

#423164
Topic: Molecular orbital theory

Write the important conditions required for the linear combination of atomic orbitals to form molecular orbitals

Solution

(a) The energy of the combining atomic orbitals should be approximately same.

Thus, in case of homonuclear diatomic molecule, 1s orbital of an atom can combine with 1s orbital of second atom but not with 2s orbital of second atom.

(b) To ensure maximum overlap, the combining atomic orbitals should have proper orientation.

(c) The extent of overlap should be large.

#423165

Topic: Molecular orbital theory

Use molecular orbital theory to explain why Be_2 molecule does not exist.

Solution

Be_2 molecule has MO electronic configuration $KK(\sigma s)^2(\sigma^*2s)^2$.

The bond order is $\dfrac{2-2}{2}=0$.

Zero bond order indicates that Be_2 molecule does not exists.

#423166

Topic: Molecular orbital theory

Compare the relative stability of the following species and indicate their magnetic properties.

$O_2,\ O_2^+,\ {O_2}^-$ (superoxide), ${O_2}^{2-}$ (peroxide)

Solution

(1) The electronic configuration of O_2 molecule is

$KK(\sigma 2s)^2(\sigma^*2s)^2(\sigma 2p_z)^2(\pi 2p_x)^2(\pi 2p_y)^2(\pi^*2p_x)^1(\pi^*2p_y)^1$

Its bond order is $\dfrac{8-4}{2}=2$.

It contains 2 unpaired electrons and is paramagentic.

(2) The electronic configuration of O_2^+ ion is

$KK(\sigma 2s)^2(\sigma^*2s)^2(\sigma 2p_z)^2(\pi 2p_x)^2(\pi 2p_y)^2(\pi^*2p_x)^1$

Its bond order is $\dfrac{8-3}{2}=2.5$.

It contains 1 unpaired electron and is paramagentic.

(3) The electronic configuration of O_2^- ion is

$KK(\sigma 2s)^2(\sigma^*2s)^2(\sigma 2p_z)^2(\pi 2p_x)^2(\pi 2p_y)^2(\pi^*2p_x)^2(\pi^*2p_y)^1$

Its bond order is $\dfrac{8-5}{2}=1.5$.

It contains 1 unpaired electron and is paramagentic.

(4) The electronic configuration of O_2^{2-} ion is

$KK(\sigma 2s)^2(\sigma^*2s)^2(\sigma 2p_z)^2(\pi 2p_x)^2(\pi 2p_y)^2(\pi^*2p_x)^2(\pi^*2p_y)^2$

Its bond order is $\dfrac{8-6}{2}=1$.

It contains all paired electrons and is diamagentic.

Higher is the bond order, stronger is the bond, and higher is the stability.

The decreasing order of the stability is $O_2^+ > O_2 > {O_2}^- > O_2^{2-}$.

#423169

Topic: Hybridisation

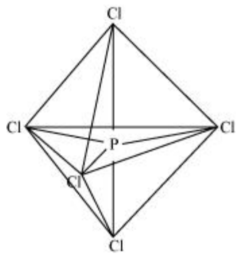
Describe the hybridisation in case of PCl_5. Why are the axial bonds longer as compared to equatorial bonds?

Solution

P has ground state valence shell electronic configuration $3s^2 3p3$ and the first excited state valence shell electronic configuration is $3s^1 3p^3 3d^1$.

P undergoes sp^3d hybridization and has trigonal bipyramidal geometry.

Axial Cl atoms experience higher electron repulsion than equatorial chlorine atoms. Hence, the axial bonds are longer as compared to equatorial bonds.



#423172

Topic: Hydrogen bonding

Define hydrogen bond. Is it weaker or stronger than the Van der Waals forces?

Solution

A hydrogen bond is the electrostatic attraction between polar groups that occurs when a hydrogen (H) atom bound to a highly electronegative atom such as nitrogen (N), oxygen (O) or fluorine (F) experiences attraction to some other nearby highly electronegative atom. These hydrogen-bond attractions can occur between molecules (intermolecular) or within different parts of a single molecule (intramolecular). The hydrogen bond (5 to 30 kJ/mole) is stronger than a van der Waals interaction, but weaker than covalent or ionic bonds. This type of bond can occur in inorganic molecules such as water and in organic molecules like DNA and proteins.

#423174

Topic: Molecular orbital theory

What is meant by the term bond order ? Calculate the bond order of $N_2,\ O_2$, O_2^+ and $O_2{}^-$.

Solution

The number of covalent bonds present in covalent molecule is called bond order. It is one half the difference between the number of electrons in the bonding and antibonding molecular orbitals.

Bond order $= \dfrac{\text{number of electrons in bonding Molecular orbitals}}{\text{number of electrons in antibonding Molecular orbitals}}$

(i) For N_2 molecule,

The electronic configuration is $KK(\sigma 2s)^2(\sigma^*2s)^2(\pi 2p_x)^2(\pi 2p_y)^2(\sigma 2p_z)^2$.

Its bond order is $\dfrac{8-2}{2} = 3$.

(ii)The electronic configuration of O_2 molecule is $KK(\sigma 2s)^2(\sigma^*2s)^2(\sigma 2p_z)^2(\pi 2p_x)^2(\pi 2p_y)^2(\pi^*2p_x)^1(\pi^*2p_y)^1$.

Its bond order is $\dfrac{8-4}{2} = 2$.

(iii)The electronic configuration of O_2^+ ion is $KK(\sigma 2s)^2(\sigma^*2s)^2(\sigma 2p_z)^2(\pi 2p_x)^2(\pi 2p_y)^2(\pi^*2p_x)^1$.

Its bond order is $\dfrac{8-3}{2} = 2.5$.

(iv)The electronic configuration of O_2^- molecule is $KK(\sigma 2s)^2(\sigma^*2s)^2(\sigma 2p_z)^2(\pi 2p_x)^2(\pi 2p_y)^2(\pi^*2p_x)^2(\pi^*2p_y)^1$.

Its bond order is $\dfrac{8-5}{2} = 2.5$.

#423530

Topic: Valence bond theory

Passage

Arrange the following.

$H-H, D-D$ and $F-F$ in order of increasing bond dissociation enthalpy.

Solution

Bond dissociation energy depends on bond strength. Bond strength depends on the attractive and repulsion forces present in a molecule. Due to higher nuclear mass of D_2, the attraction between nucleus and bond pair in $D-D$is stronger than in $H-H$. This results in greater bond strength and higher bond dissociation enthalpy. Thus, the bond dissociation enthalpy of $D-D$is higher than that of $H-H$.

The bond dissociation enthalpy of $F-F$ is minimum as the repulsion between the bond pair and lone pairs of F is strong. Hence, the increasing order of bond dissociation enthalpy is $F-F<H-H<D-D$

#423539

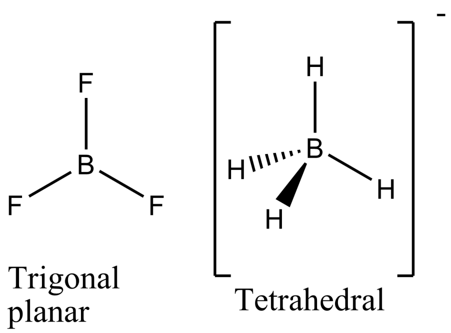
Topic: Hybridisation

Describe the shapes of BF_3 and BH_4^- . Assign the hybridisation of boron in these species.

Solution

The central B atom in BF_3 undergoes sp^2 hybridization which results in trigonal planar geometry with three bond pairs and 0 lone pairs of electrons.

The central B atom in BH_4^- undergoes sp^3 hybridization which results in tetrahedral geometry with 4 bond pairs and 0 lone pairs of electrons.



#423555

Topic: Hybridisation

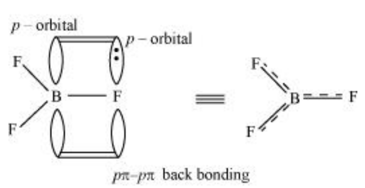
Suggest reasons why the BF bond lengths in BF_3 (130 pm) and $BF_4{}^-$ (143 pm) differ.

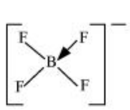
Solution

In BF_3 molecule, $B-F$ bond has partial double bond due to presence of $p\pi-p\pi$backbonding between B and F, which removes the electron deficiency of the molecule.

Due to this, $B-F$ bond length is reduced to 130 pm. When BF_3 changes to BF_4^-, the hybridization changes from sp^2 to sp^3.

The double bond character changes to single bond and the $B-F$ bond length becomes 143 pm.





#423559

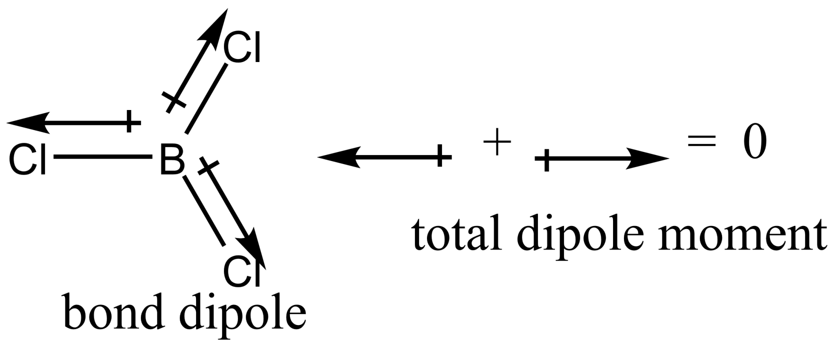
Topic: Hybridisation

If BCl bond has a dipole moment, explain why BCl_3 molecule has zero dipole moment.

Solution

B-Cl bond is polar due to electronegativity difference between B and Cl.

In BCl_3, the central B atom undergoes sp^2 hybridization which results in plane triangular geometry. The molecule has symmetry and the individual bond dipoles cancel each other. Hence, the molecule has zero dipole moment.



#423623
Topic: Hybridisation

What are hybridisation states of each carbon atom in the following compounds?

$CH_2 = C = O,\ CH_3CH = CH_2,\ (CH_3)_2CO,\ CH_2 = CHCN,\ C_6H_6$

Solution

The hybridisation states of each carbon atom in the following compounds are given below.

$\underset{sp^2}{C}H_2 = \underset{sp}{C} = O,\ \underset{sp^3}{C}H_3\underset{sp^2}{C}H = \underset{sp^2}{C}H_2,\ (\underset{sp^3}{C}H_3)_2\underset{sp^2}{C}O,\ \underset{sp^2}{C}H_2 = \underset{sp^2}{C}H\underset{sp^3}{C}N,\ \underset{sp^2}{C_6}H_6$

#423627
Topic: Valence bond theory

Indicate the σ and π bonds in the following molecules.

$C_6H_6, C_6H_{12}, CH_2Cl_2, CH_2 = C = CH_2, CH_3NO_2, HCONHCH_3$

Solution

Benzene contains 6 $C-C$ sigma bonds, 3 $C=C$ pi bonds and six $C-H$ sigma bonds respectively.

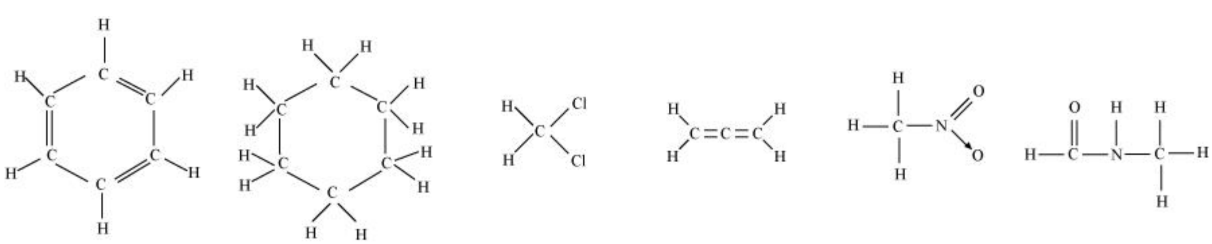
Cyclohexane contains 6 $C-C$ sigma bonds and 12 $C-H$ pi bonds.

Dichloromethane contains 2 $C-H$ sigma bonds and 2 $C-Cl$ sigma bonds.

Allene contains 2 $C-C$ sigma bonds, 2 $C=C$ pi bonds and 4 $C-H$ pi bonds.

Nitromethane contains 3 $C-H$ sigma bonds, 1 $C-N$ sigma bond, 2 $N-O$ sigma bonds and 1 $N=O$ pi bond.

N-methyl formamide contains 2 $C-N$ sigma bonds, four $C-H$ sigma bonds, one $N-H$ sigma bond, one $C-O$ sigma bond and one $C-O$ pi bond.



Benzene Cyclohexane Dichloromethane Allene Nitromethane N-methyl formamide

#423885

Topic: Hybridisation

In the organic compound $CH_2 = CH - CH_2 - CH_2 - C \equiv CH$the pair of hydridized orbitals involved in the formation of: $C_2 - C_3$ bond is

Solution

In the organic compound $CH_2 = CH - CH_2 - CH_2 - C \equiv CH$the pair of hydridised orbitals involved in the formation of: $C_2 - C_3$ bond is $sp^2 - sp^3$. The second carbon atom has one double bond.

#423886

Topic: Hybridisation

In the organic compound $CH_2 = CH - CH_2 - CH_2 - C \equiv CH$the pair of hybridized orbitals involved in the formation of: $C_2 - C_3$ bond is:

Solution

In the organic compound $CH_2 = CH - CH_2 - CH_2 - C \equiv CH$the pair of hybridized orbitals involved in the formation of: $C_2 - C_3$ bond is $sp^2 - sp^3$. The second carbon atom has one double bond.

#423888

Topic: Hybridisation

In the organic compound $CH_2 = CH - CH_2 - CH_2 - C \equiv CH$the pair of hybridized orbitals involved in the formation of $C_2 - C_3$ bond is:

Solution

In the organic compound $CH_2 = CH - CH_2 - CH_2 - C \equiv CH$the pair of hybridized orbitals involved in the formation of $C_2 - C_3$ bond is $sp^2 - sp^3$. The second carbon atom has one double bond.

#423890

Topic: Hybridisation

In the organic compound $CH_2 = CH - CH_2 - CH_2 - C \equiv CH$the pair of hybridized orbitals involved in the formation of: $C_2 - C_3$ bond is :

Solution

In the organic compound $CH_2 = CH - CH_2 - CH_2 - C \equiv CH$the pair of hybridized orbitals involved in the formation of: $C_2 - C_3$ bond is $sp^2 - sp^3$. The second carbon atom has one double bond.

#464758

Topic: Covalent compounds

Ethane, with the molecular formula C_2H_6 has:

A 6 covalent bonds

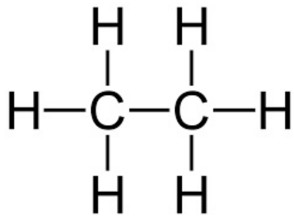
[B] 7 covalent bonds

C 8 covalent bonds

D 9 covalent bonds

Solution

Ethane with molecular formula C_2H_6 has seven covalent bonds. 6 bonds between $C-H$ and one is between $C-C$. The six hydrogen atoms will each share their 1 electron with carbon to form six carbon-hydrogen covalent bonds. The two carbon atoms will each share their 1 electron to form one carbon-carbon covalent bond.



#465138

Topic: Covalent compounds

Draw the electronic dot structures for :

(a) ethanoic acid.

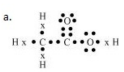
(b) H_2S

(c) propanone.

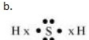
(d) F_2

Solution

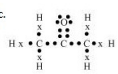
a.



b.



c.



d.