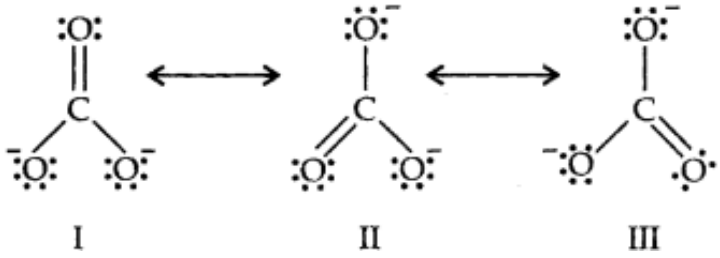
Question 11. Explain the important aspects of resonance with reference to the CO_3^{2-} ion.

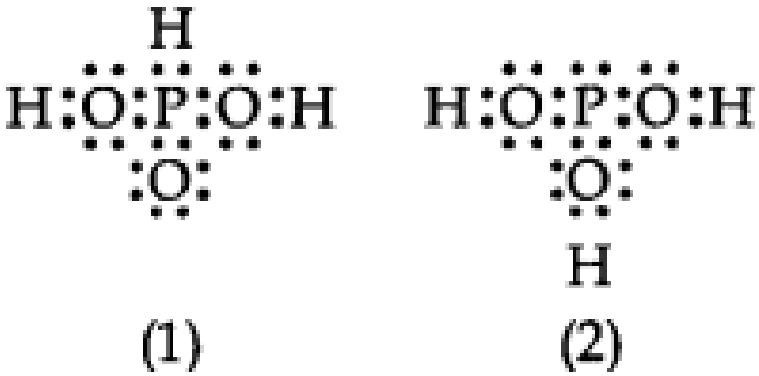
Answer:



Resonance in CO_3^{2-}, I, II and III represent the three canonical forms.

- In these structures, the position of nuclei are same.
- All the three forms have almost equal energy.
- Same number of paired and impaired electrons, they differ only in their position.

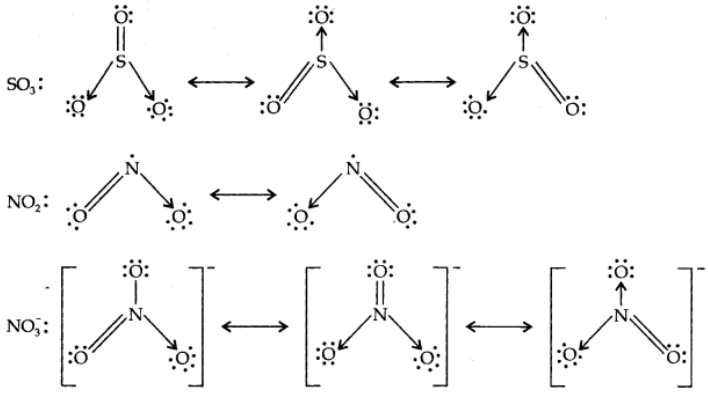
Question 12. H_3PO_3 can be represented by structures 1 and 2 shown below. Can these two structures be taken as the canonical forms of the resonance hybrid representing H_3PO_3? If not, give reasons for the same.



Answer: No, these cannot be taken as canonical forms because the positions of atoms have been changed.

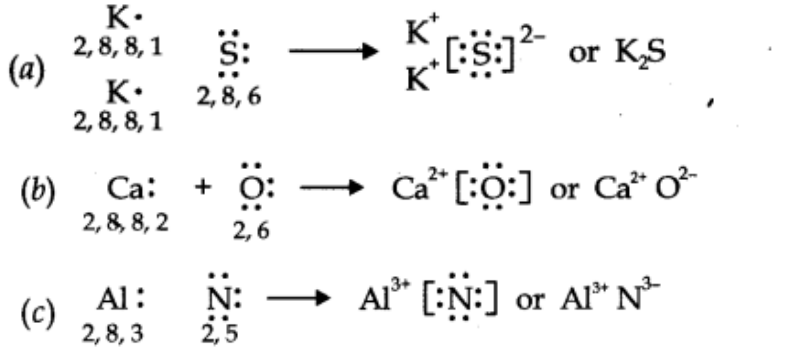
Question 13. Write the resonance structures for SO_3, NO_2 and NO_3^-

Answer:



Question 14. 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.
Answer:



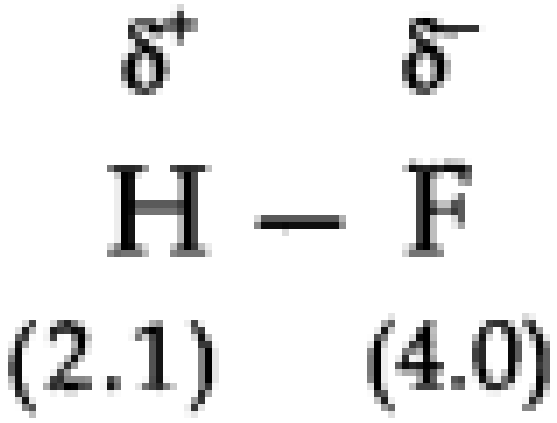
Question 15. Although both CO_2 and H_2O are triatomic molecules, the shape of H_2O molecule is bent while that of CO_2 is linear. Explain this on the basis of dipole moment.
Answer:
In CO_2, there are two C=O bonds. Each C=O bond is a polar bond. The net dipole moment of $C0_2$ molecule is zero. This is possible only if CO_2 is a linear molecule. (O=C=O). The bond dipoles of two C=O bonds cancel the moment of each other.
Whereas, H_2O molecule has a net dipole moment (1.84 D). H_2O molecule has a bent structure because here the O-H bonds are oriented at an angle of 104.5° and do not cancel the bond moments of each other.

Question 16.Write the significance/applications of dipole moment.
Answer:

- In predicting the nature of the molecules: Molecules with specific dipole moments are polar in nature and those of zero dipole moments are non-polar in nature.
- In the determination of shapes of molecules.
- In calculating the percentage ionic character.

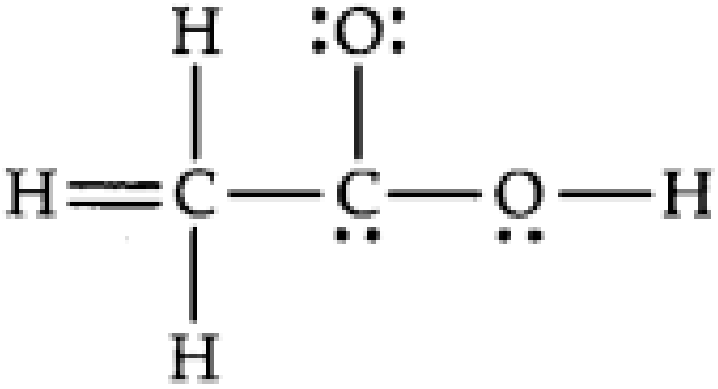
Question 17. Define electronegativity. How does it differ from electron gain enthalpy?
Answer:
Electronegativity: Electronegativity is the tendency of an atom to attract shared pair of electrons. It is the property of bonded atom. Whereas, electron gain enthalpy is the tendency of an atom to attract outside electron. It is the property of an isolated atom.

Question 18. Explain with the help of suitable example polar covalent bond.
Answer:
When two atoms with different electronegativity are linked to each other by covalent bond, the shared electron pair will not in the centre because of the difference in electronegativity. For example, in hydrogen flouride molecule, flouride has greater electronegativity than hydrogen. Thus, the shared electron pair is displaced more towards'flourine atom, the later will acquire a partial negative charge (∂^-). At the same time hydrogen atom will have a partial positive charge (∂^+). Such a covalent bond is known as polar covalent bond or simply polar bond.
It is represented as

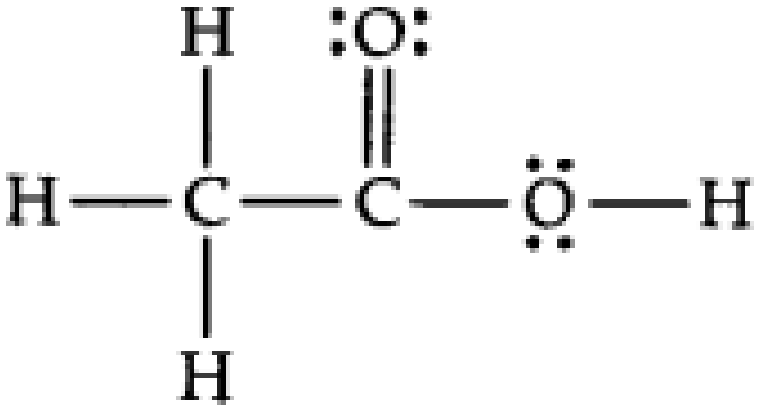


Question 19. Arrange the bonds in order of increasing ionic character in the molecules: LiF, K_2O, N_2, SO_2 and ClF_3.
Answer: $N_2 < SO_2 < ClF_3 < K_2O < LiF$

Question 20. The skeletal structure of CH_3COOH as shown below is correct, but some of the bonds are shown incorrectly. Write the correct Lewis structure for acetic acid.



Answer:



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