



CHEMISTRY

NCERT - NCERT CHEMISTRY(ENGLISH)

CHEMICAL BONDING AND MOLECULAR STRUCTURE

Solved Example

1. Write the Lewis dot structure of CO molecule .



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2. Draw the Lewis structure of NO_2^- (Nitrite ion) .



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3. Explain the structure of CO_3^{2-} ion in terms of resonance

(b) Explain the resonance structures of CO_2 molecule .



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4. Explain the structure of CO_3^{2-} ion in terms of resonance

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Exercise

1. Explain the formation of a chemical bond.



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



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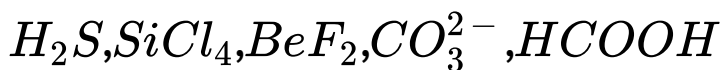
3. Write Lewis symbols for the following atoms and ions:

S and S^{2-} , Al and Al^{3+} , H and H^{\ominus}



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4. Draw the Lewis structures for the following molecules and ions:



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5. Define octet rule. Write its significance and limitations.



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6. Write the favourable factors for the formation of ionic bond.



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7. Discuss the shape of the following molecules using the *VSEPR* model:

BeCl₂, BCl₃, SiCl₄, AsF₅, H₂S, PH₃



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

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9. How do you express the bond strength in terms of bond order?

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10. Define the bond length.



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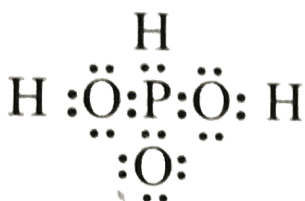
11. Explain the important aspects of resonance with reference to the CO_3^{2-} ion.



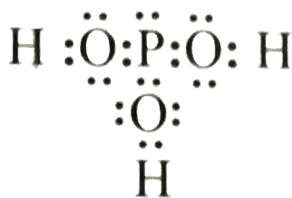
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12. H_3PO_3 can be represented by structure (a) and (b) shown below. Can these two structures

be taken as the canonical forms of the resonance hybrid representing H_3PO_3 ? If not, give reasons for the same.



(a)



(b)

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13. Write the resonance structures for SO_3 , NO_2 , and NO_3^\ominus .

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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.



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15. Although both CO_2 and H_2O are triatomic molecules, the shape of H_2O molecules is

bent while that of CO_2 is linear. Explain this on the basis of dipole moment.



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16. Write the significance/applications of dipole moment



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17. Define electronegativity. How does it differ from electron gain enthalpy ?



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



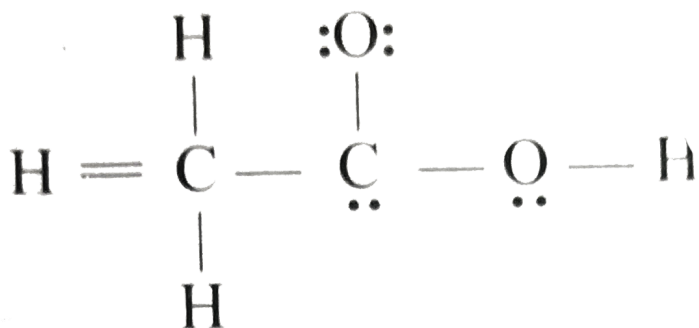
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19. Arrange the bonds in order of increasing ionic character in the molecules: LiF , K_2O , N_2 , SO_2 and ClF_3 .



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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.



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21. Apart from tetrahedral geometry, another possible geometry for CH_4 is square planar with the four H atoms at the corners of the square and the C atom at its centre. Explain why CH_4 is not square planar?



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





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23. Out of NH_3 and NF_3 which has a higher Dipole moment?



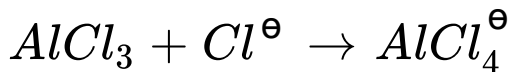
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24. What is meant by hybridisation of atomic orbitals? Describe the shape of sp, sp^2, sp^3 hybrid orbitals.



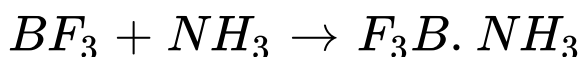
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25. Describe the change in hybridization (if any) of the *Al* atom in the following:



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26. Is there any change in hybridisation of the *B* and *N* atom as a result of the following reaction?



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27. 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.



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28. what is the total number of sigma and pi bonds in the following molecules?

a. C_2H_2 , b. C_2H_4



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29. Considering X axis as the inter nuclear axis, which out of the following will form a sigma bond

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

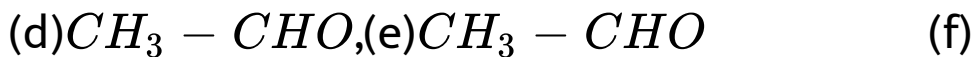
(c) $2p_y$ and $2p_y$ (d) $2p_x$ and $2p_y$

(e) $1s$ and $2s$.`



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



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



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32. Distinguish between a sigma and a pi bond.



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



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



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35. Use molecular orbital theory to explain why the Be_2 molecules do not exist?



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

$O_2, O_2^{\oplus}, O_2^{\ominus}$ (super oxide), O_2^{-2} (peroxide).



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37. Write the significance of a plus and a minus sign shown in representing the orbitals.



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38. Describe the hybridisation in case of PCl_5 .

Why are the axial bonds longer as compared to equatorial bonds?



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



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40. What is meant by the term bond order?

Calculate the bond order of N_2 , O_2 , O_2^{\oplus} and

O_2^{\ominus} .



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