CHEMISTRY

NCERT - NCERT CHEMISTRY(HINGLISH)

CHEMICAL BONDING AND MOLECULAR STRUCTURE

Solved Example

1. Write the Lewis dot structure of CO molecule .

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2. Write the Lewis dot structure of the nitrite ion $\left(NO_2^{\Theta}\right)$.

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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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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:

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

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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:

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

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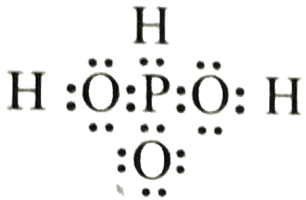
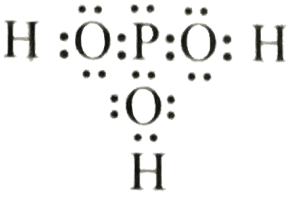
12. H_3PO_3 can be represented by structure (a) and (b) shown below. Can these two structures

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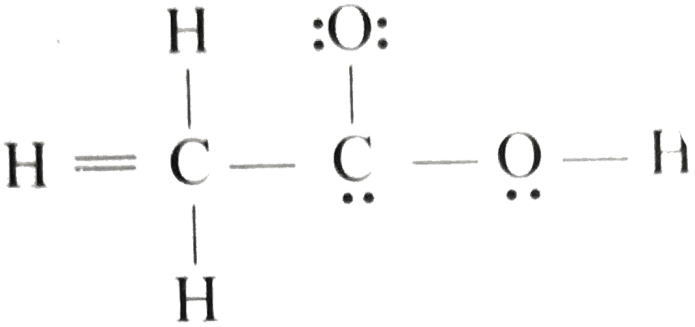
20. The skeletal structure of CH_3COOH as shown below is correct, but some of the bonds are shown incorrectly. Write the correct Lewis structure for acetic acid.



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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:

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

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

$$BF_3 + NH_3 \rightarrow F_3B.NH_3$$

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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?

(a) $CH_3 - CH_3$

(b) $CH_3 - CH = CH_2$

(c) $CH_3 - CH_2OH$

(d) $CH_3 - CHO$

(e) CH_3COOH

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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 hydribisation 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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