

Chemical Bonding and Molecular Structure

NEET previous year questions · Chemistry

6 questions from the official papers: NEET 2026 (2), Re-NEET 2026 (2), NEET 2020 (2). Each is followed by its answer and a worked solution written by BrainIt. Generated on 23 October 2026.



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1. NEET 2026 · Q59

Match List-I with List-II and choose the correct answer from the options given below:

List I	List II
P) C_2H_4	I) 3 σ bonds, 2 π bonds
Q) C_2H_2	II) 3 σ bonds, one lone pair
R) CH_4	III) 4 σ bonds
S) NH_3	IV) 5 σ bonds, 1 π bond

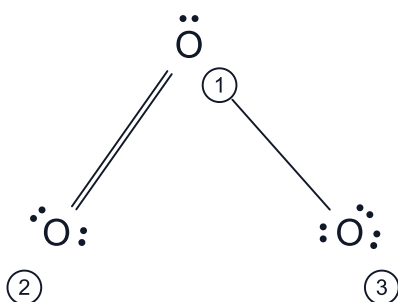
- (1) P-III, Q-IV, R-II, S-I (2) P-IV, Q-I, R-III, S-II
(3) P-I, Q-II, R-IV, S-III (4) P-II, Q-III, R-I, S-IV

Answer (2)

Sol. Ethene (C_2H_4) has 4 C-H plus 1 C-C sigma bonds (5 sigma) and 1 pi bond (IV). Ethyne (C_2H_2) has 2 C-H plus 1 C-C sigma (3 sigma) and 2 pi bonds (I). Methane (CH_4) has 4 C-H sigma bonds (III). Ammonia (NH_3) has 3 N-H sigma bonds and one lone pair on nitrogen (II). Hence P-IV, Q-I, R-III, S-II.

2. NEET 2026 · Q82

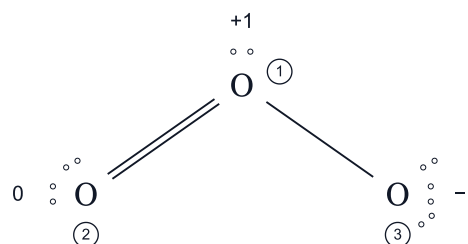
For the given Lewis (resonance) structure of ozone, the correct formal charges on the oxygen atoms numbered 2, 1 and 3 respectively are:



- (1) -1, 0, +1 (2) 0, +1, -1 (3) 0, 0, 0 (4) +1, 0, -1

Answer (2)

Sol. Formal charge = (valence electrons) - (non-bonding electrons) - $\frac{1}{2}$ (bonding electrons). For the doubly bonded terminal O (atom 2): $6 - 4 - \frac{1}{2}(4) = 0$; the central O (atom 1): $6 - 2 - \frac{1}{2}(6) = +1$; the singly bonded terminal O (atom 3): $6 - 6 - \frac{1}{2}(2) = -1$. This gives 0, +1, -1, matching option (2).



3. Re-NEET 2026 · Q75

Match the species in List-I with their geometry in List-II.

List I	List II
P) PCl_5	I) Tetrahedral
Q) BrF_5	II) Square Planar
R) BF_4^-	III) Trigonal bipyramidal
S) $[Ni(CN)_4]^{2-}$	IV) Square pyramidal

Choose the correct answer from the options given below:

- (1) P-IV, Q-III, R-I, S-II (2) P-III, Q-IV, R-I, S-II
(3) P-III, Q-I, R-II, S-IV (4) P-III, Q-II, R-I, S-IV

Answer (2)

Sol. PCl_5 has five bond pairs and no lone pair, so it is trigonal bipyramidal (P-III). BrF_5 has five bond pairs plus one lone pair; the lone pair occupies one octahedral position and pushes the shape to square pyramidal (Q-IV). BF_4^- is four bond pairs with no lone pair, hence tetrahedral (R-I). $[Ni(CN)_4]^{2-}$ is a $Ni^{2+} d^8$ complex with the strong-field cyanide ligand, forcing dsp^2 hybridisation and a square planar

geometry (S-II). NCERT Class 11, Chemical Bonding and Molecular Structure; NCERT Class 12, Coordination Compounds.

4. Re-NEET 2026 · Q90

The highest occupied molecular orbital for Ne_2 is

- (1) π_{2p} (2) σ_{2p}
(3) π_{2p}^* (4) σ_{2p}^*

Answer (4)

Sol. Ne_2 has 20 electrons, enough to fill every molecular orbital derived from the 1s, 2s and 2p atomic orbitals. Filling in order, $\sigma_{1s}^2 \sigma_{1s}^{*2} \sigma_{2s}^2 \sigma_{2s}^{*2} \sigma_{2p}^2 \pi_{2p}^4 \pi_{2p}^{*4} \sigma_{2p}^{*2}$, the last two electrons enter σ_{2p}^* , which is therefore the HOMO. With every bonding orbital matched by its antibonding partner the bond order is zero, which is why Ne_2 does not exist as a stable molecule. NCERT Class 11, Chemical Bonding and Molecular Structure.

5. NEET 2020 · Q100

Which of the following set of molecules will have zero dipole moment?

- (1) Boron trifluoride, hydrogen fluoride, carbon dioxide, 1,3-dichlorobenzene
(2) Nitrogen trifluoride, beryllium difluoride, water, 1,3-dichlorobenzene
(3) Boron trifluoride, beryllium difluoride, carbon dioxide, 1,4-dichlorobenzene
(4) Ammonia, beryllium difluoride, water, 1,4-dichlorobenzene

Answer (3)

Sol. Boron trifluoride, beryllium difluoride, and carbon dioxide have symmetrical structures leading to zero net dipole moments. 1,4-dichlorobenzene also has a symmetrical structure, making the net dipole moment zero. Chapter: Chemical Bonding and Molecular Structure.

6. NEET 2020 · Q126

Identify a molecule which does not exist.

- (1) Li_2 (2) C_2 (3) O_2 (4) He_2

Answer (4)

Sol. He_2 does not exist because helium atoms have a complete outer shell and do not form stable bonds with each other. In contrast, Li_2 , C_2 , and O_2 can form stable molecules. Chapter: Chemical Bonding and Molecular Structure.

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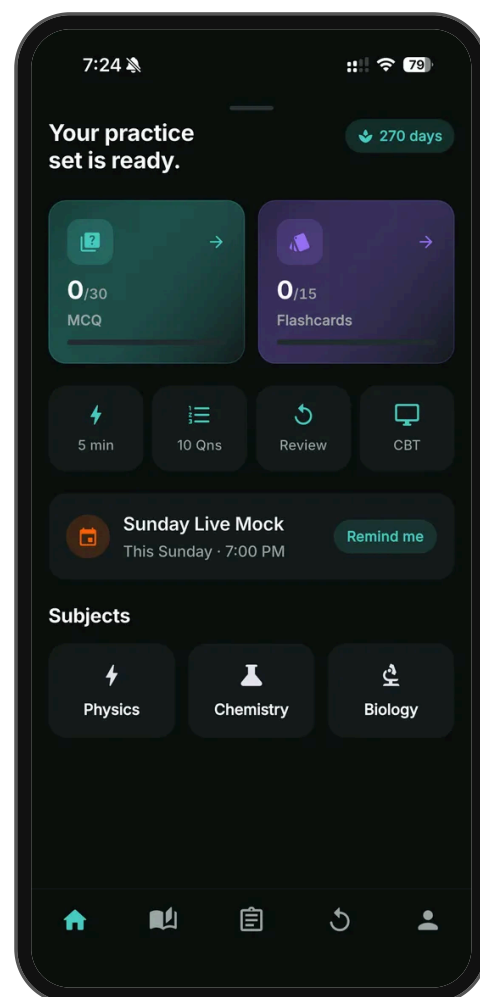
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