

NEET CHEMICAL BONDING AND MOLECULAR STRUCTURE — MOLECULAR ORBITAL THEORY (MOT) — PYQS

Max. Marks: 112

Questions: 28

Section A (MCQ) — 28 questions

Q.1 The highest occupied molecular orbital for Ne_2 is

[RE-NEET (UG) 2026]

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

Scan or tap for the
full solution



Q.2 Given below are two statements :

Statement-I: A hypothetical diatomic molecule with bond order zero is quite stable.

Statement-II: As bond order increases, the bond length increases.

In the light of the above statements, choose the most appropriate answer from the options given below:

[NEET (UG) 2025]

- (1) Statement-I is true but Statement-II is false
(2) Statement-I is false but Statement-II is true
(3) Both Statement-I and Statement-II are true
(4) Both Statement-I and Statement-II are false

Scan or tap for the
full solution



Q.3 Match List I with List II.

List I (Molecule)		List II (Number and types of bond/s between two carbon atoms)	
A.	ethane	I.	one σ -bond and two π -bonds
B.	ethene	II.	two π -bonds
C.	carbon molecule, C_2	III.	one σ -bond
D.	ethyne	IV.	one σ -bond and one π -bond

Choose the correct answer from the options given below :

[NEET (UG) 2024]

- (1) A-I, B-IV, C-II, D-III (2) A-IV, B-III, C-II, D-I
(3) A-III, B-IV, C-II, D-I (4) A-III, B-IV, C-I, D-II

Scan or tap for the
full solution



Q.4 The correct order of energies of molecular orbitals of N_2 molecule, is

[NEET (UG) 2023]

- (1) $\sigma_{1s} < \sigma_{1s}^* < \sigma_{2s} < \sigma_{2s}^* < \sigma_{2p_z} < (\pi_{2p_x} = \pi_{2p_y}) < (\pi_{2p_x}^* = \pi_{2p_y}^*) < \sigma_{2p_z}^*$
(2) $\sigma_{1s} < \sigma_{1s}^* < \sigma_{2s} < \sigma_{2s}^* < \sigma_{2p_z} < \sigma_{2p_z}^* < (\pi_{2p_x} = \pi_{2p_y}) < (\pi_{2p_x}^* = \pi_{2p_y}^*)$
(3) $\sigma_{1s} < \sigma_{1s}^* < \sigma_{2s} < \sigma_{2s}^* < (\pi_{2p_x} = \pi_{2p_y}) < (\pi_{2p_x}^* = \pi_{2p_y}^*) < \sigma_{2p_z} < \sigma_{2p_z}^*$
(4) $\sigma_{1s} < \sigma_{1s}^* < \sigma_{2s} < \sigma_{2s}^* < (\pi_{2p_x} = \pi_{2p_y}) < \sigma_{2p_z} < (\pi_{2p_x}^* = \pi_{2p_y}^*) < \sigma_{2p_z}^*$

Scan or tap for the
full solution



Q.5 Which amongst the following is incorrect statement?

[NEET (UG) 2022]

- (1) The bond orders of O_2^+ , O_2 , O_2^- and O_2^{2-} are 2.5, 2, 1.5 and 1, respectively
(2) C_2 molecule has four electrons in its two degenerate π molecular orbitals
(3) H_2^+ ion has one electron
(4) O_2^+ ion is diamagnetic

Scan or tap for the
full solution



Q.6 Identify a molecule which does not exist.

[NEET (UG) 2020]

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

Scan or tap for the
full solution



Q.7 Which of the following diatomic molecular species has only π bonds according to Molecular Orbital Theory?

[NEET (UG) 2019]

- (1) C_2 (2) Be_2 (3) O_2 (4) N_2

Scan or tap for the
full solution



Q.8 Consider the following species : CN^+ , CN^- , NO and CN . Which one of these will have the highest bond order?

[NEET 2018]

- (1) NO (2) CN^- (3) CN^+ (4) CN

Scan or tap for the
full solution



Q.9 Which one of the following pairs of species have the same bond order ? [NEET 2017]

- (1) O_2 , NO^+ (2) CN^- , CO
(3) N_2 , O_2^- (4) CO , NO

Scan or tap for the full solution



Q.10 Decreasing order of stability of O_2 , O_2^- , O_2^+ and O_2^{2-} is [AIPMT 2015]

- (1) $O_2^{2-} > O_2^- > O_2 > O_2^+$
(2) $O_2 > O_2^+ > O_2^{2-} > O_2^-$
(3) $O_2^- > O_2^{2-} > O_2^+ > O_2$
(4) $O_2^+ > O_2 > O_2^- > O_2^{2-}$

Scan or tap for the full solution



Q.11 The correct bond order in the following species is [AIPMT 2015 (Cancelled)]

- (1) $O_2^+ < O_2^- < O_2^{2+}$ (2) $O_2^- < O_2^+ < O_2^{2+}$
(3) $O_2^{2+} < O_2^+ < O_2^-$ (4) $O_2^{2+} < O_2^- < O_2^+$

Scan or tap for the full solution



Q.12 Which of the following options represents the correct bond order ? [AIPMT 2015 (Cancelled)]

- (1) $O_2^- > O_2 < O_2^+$ (2) $O_2^- < O_2 > O_2^+$
(3) $O_2^- > O_2 > O_2^+$ (4) $O_2^- < O_2 < O_2^+$

Scan or tap for the full solution



Q.13 Which of the following is paramagnetic? [NEET 2013]

- (1) CN^- (2) NO^+ (3) CO (4) O_2^-

Scan or tap for the full solution



Q.14 The pair of species that has the same bond order in the following is [NEET 2013 (Karnataka)]

- (1) CO , NO^+ (2) NO^- , CN^-
(3) O_2 , N_2 (4) O_2 , B_2

Scan or tap for the full solution



Q.15 In which of the following ionization processes the bond energy increases and the magnetic behaviour changes from paramagnetic to diamagnetic. [NEET 2013 (Karnataka)]

- (1) $O_2 \longrightarrow O_2^+$ (2) $C_2 \longrightarrow C_2^+$
(3) $NO \longrightarrow NO^+$ (4) $N_2 \longrightarrow N_2^+$

Scan or tap for the full solution



Q.16 During change of O_2 to O_2^- ion, the electron adds on which one of the following orbitals ? [AIPMT 2012 (Mains)]

- (1) π^* orbital (2) π orbital (3) σ^* orbital (4) σ orbital

Scan or tap for the full solution



Q.17 Four diatomic species are listed below. Identify the correct order in which the bond order is increasing in them [AIPMT 2012 (Mains)]

- (1) $NO < O_2^- < C_2^{2-} < He_2^+$
(2) $O_2^- < NO < C_2^{2-} < He_2^+$
(3) $C_2^{2-} < He_2^+ < O_2^- < NO$
(4) $He_2^+ < O_2^- < NO < C_2^{2-}$

Scan or tap for the full solution



Q.18 Bond order of 1.5 is shown by [AIPMT 2012 (Prelims)]

- (1) O_2^+ (2) O_2^- (3) O_2^{2-} (4) O_2

Scan or tap for the full solution



Q.19 The pair of species with the same bond order is [AIPMT 2012 (Prelims)]

- (1) O_2^{2-} , B_2 (2) O_2^+ , NO^+
(3) NO , CO (4) N_2 , O_2

Scan or tap for the full solution



Q.20 The pairs of species of oxygen and their magnetic behaviours are noted below. Which of the following presents the correct description? [AIPMT 2011 (Mains)]

- (1) O_2^- , O_2^{2-} – Both diamagnetic (2) O_2^+ , O_2 – Both paramagnetic
(3) O , O_2^{2-} – Both paramagnetic (4) O^+ , O_2^{2-} – Both paramagnetic

Scan or tap for the full solution



Q.21 Which of the following has the minimum bond length ? [AIPMT 2011 (Prelims)]

- (1) O_2^+ (2) O_2^- (3) O_2^{2-} (4) O_2

Scan or tap for the full solution



Q.22 The pairs of species of oxygen and their magnetic behavior are noted below. Which of the following presents the correct description? [AIPMT 2011 (Prelims)]

- (1) O_2^- , O_2^{2-} - Both diamagnetic
 (2) O^+ , O_2^{2-} - Both paramagnetic
 (3) O_2^+ , O_2 - Both paramagnetic
 (4) O , O_2^{2-} - Both paramagnetic

Scan or tap for the
full solution



Q.23 Which one of the following species does not exist under normal conditions? [AIPMT 2010 (Prelims)]

- (1) Be_2^+ (2) Be_2 (3) B_2 (4) Li_2

Scan or tap for the
full solution



Q.24 According to MO theory which of the lists ranks the nitrogen species in terms of increasing bond order ?

[AIPMT 2009]

- (1) $N_2^{2-} < N_2^- < N_2$ (2) $N_2 < N_2^{2-} < N_2^-$
 (3) $N_2^- < N_2^{2-} < N_2$ (4) $N_2^- < N_2 < N_2^{2-}$

Scan or tap for the
full solution



Q.25 Four diatomic species are listed below. Identify the correct order in which the bond order is increasing in them [AIPMT 2008]

- (1) $NO < O_2^- < C_2^{2-} < He_2^+$
 (2) $O_2^- < NO < C_2^{2-} < He_2^+$
 (3) $C_2^{2-} < He_2^+ < O_2^- < NO$
 (4) $He_2^+ < O_2^- < NO < C_2^{2-}$

Scan or tap for the
full solution



Q.26 Main axis of a diatomic molecule is z, atomic orbitals p_x and p_y overlap to form which of the following orbitals. [AIPMT 2001]

- (1) π molecular orbital (2) σ molecular orbital
 (3) δ molecular orbital (4) No bond will form

Scan or tap for the
full solution



Q.27 Right order of dissociation energy N_2 and N_2^+ is

[AIPMT 2000]

- (1) $N_2 > N_2^+$ (2) $N_2 = N_2^+$
 (3) $N_2^+ > N_2$ (4) none

Scan or tap for the
full solution



Q.28 Which species does not exhibit paramagnetism?

[AIPMT 2000]

- (1) N_2^+ (2) O_2^- (3) CO (4) NO

Scan or tap for the
full solution



ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	1	4	3	4	4	4	1	2	2	4	2
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	4	4	1	3	1	4	2	1	2	1	3
Ques.	23	24	25	26	27	28					
Ans.	2	1	4	1	1	3					