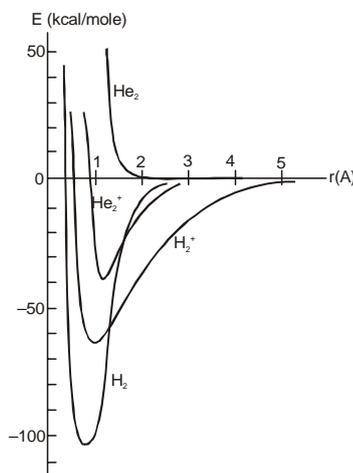


MOT

1. The following graph is given, between total energy and distance between the two nuclei for species H_2^+ , H_2 , He_2^+ & He_2 , which of the following statements is correct :



- (A) He_2^+ is more stable than H_2^+ .
 (B) Bond dissociation energy of H_2^+ is more than bond dissociation energy of He_2^+ .
 (C) Since bond orders of He_2^+ and H_2^+ are equal hence both will have equal bond dissociation energy.
 (D) Bond length of H_2^+ is less than bond length of H_2 .
2. Match the following :
- | Column | Column |
|---|--|
| (A) N_2^+ is stable than N_2^- | (p) due to one have higher electrons in antibonding than other |
| (B) NO can easily loose its electron than N_2 | (q) one have B.O. 3 and other have 2.5 |
| (C) NO have large bond length than NO^+ | (r) It is easy to remove electron from higher energy level |
| (D) He_2^+ exist but less stable than H_2^+ | (s) ABMO has more energy than corresponding BMO |
3. How many nodal plane is/are present in σ_{1s} bonding molecular orbital?
 (A) zero (B) 1 (C) 2 (D) 3
4. Which of the following combination of orbitals is correct?
- (A)
- (B)
- (C)
- (D)
5. Which of the following statements is not correct regarding bonding molecular orbitals?
- (A) Bonding molecular orbitals possess less energy than the atomic orbitals from which they are formed
 (B) Bonding molecular orbitals have low electron density between the two nuclei
 (C) Every electron in bonding molecular orbitals contributes to the attraction between atoms
 (D) They are formed when the lobes of the combining atomic orbitals have the same sign

7. Fill in the blanks :

Molecule or ion	MO configuration	Bond order	Magnetic Behaviour
H ₂	($\sigma 1s^2$)	1	Diamagnetic
H ₂ ⁺	–	–	–
H ₂ [–]	–	–	–
He ₂	–	–	–
N ₂	–	–	–
O ₂	–	–	–
O ₂ ⁺	–	–	–
O ₂ ²⁺	–	–	–
F ₂	–	–	–
Ne ₂	–	–	–
CO	–	–	–
CN	–	–	–
CN [–]	–	–	–

8. In the following which of the two are paramagnetic
 (a) N₂ (b) CO (c) B₂ (d) NO₂. Then Correct answer is
 (A) a and c (B) b and c (C) c and d (D) b and d
9. Of the following species, which has the highest bond order and shortest bond length ? NO, NO⁺, NO²⁺, NO[–]
10. Which of the following pairs of species would you expect to have largest difference in magnetic moment ?
 (A) O₂, O₂⁺ (B) O₂, O₂^{2–} (C) O₂⁺, O₂^{2–} (D) O₂[–], O₂⁺
11. Order of stability of N₂, N₂⁺ and N₂[–] is
 (A) N₂ > N₂⁺ > N₂[–] (B) N₂⁺ > N₂ > N₂[–] (C) N₂[–] > N₂ > N₂⁺ (D) N₂[–] = N₂⁺ > N₂
12. Which of the following forms only π -bond using M.O. theory :
 (A) Li₂ (B) C₂ (C) N₂ (D) O₂
13. According to M.O. theory HOMO in O₂[–] is :
 (A) $\pi 2p_x = \pi 2p_y$ (B) $\pi 2p_x = \pi 2p_y$ (C) $\sigma 2p_z$ (D) $\sigma 2p_z$

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1. (B) 2. A–p, B–r, C–q, D–s 3. (A) 4. (C) 5. (B) 8. (C) 9. NO⁺ 10. (B)
 11. (A) 12. (B) 13. (B)