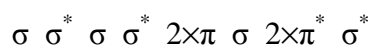


Marks
6

- The electronic energies of the molecular orbitals of diatomics consisting of atoms from H to Ne can be ordered as follows (with energy increasing from left to right):



(the '2×' denotes a pair of degenerate orbitals)

Use this ordering of the molecular orbitals to identify the following species.

- (i) The lowest molecular weight diatomic ion (homo- or heteronuclear) that has **all** of the following characteristics:

- a single negative charge,
- a bond order greater than zero *and*
- is diamagnetic.

- (ii) A diatomic species that has the same electronic configuration as O₂.

- (iii) All of the atoms with atomic numbers less than or equal to 10 that cannot form stable, neutral, homonuclear diatomic molecules.

Given that there are three degenerate *p* orbitals in an atom, why are there only two degenerate π orbitals in a diatomic molecule?