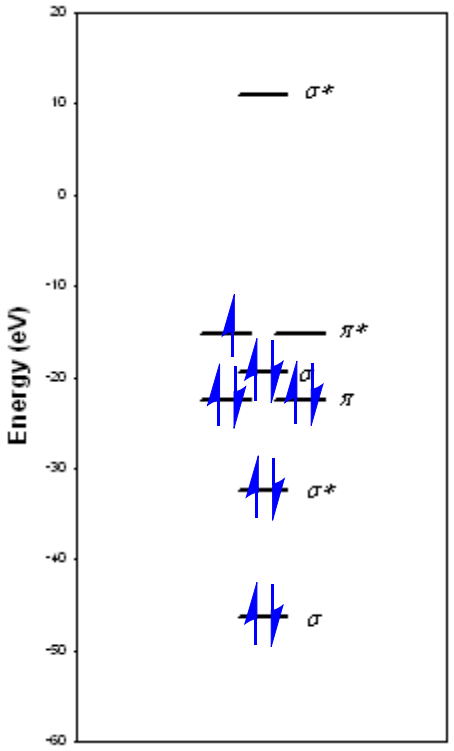
Marks 4

- The following relate to the electronic structure of the O_2^+ molecular ion.

How many valence electrons are there in O_2^+?

6 e^- on each O, minus 1 for the +ve charge: 11 e^-

Complete the MO diagram for the ground state electronic configuration of O_2^+ by inserting an arrow to represent each valence electron.



What is the bond order of O_2^+?

There are 8 electrons in bonding orbitals (two in σ and four in π) and 3 electrons in anti-bonding orbitals (two in σ* and one in π*): bond order = ½ (8-3) = 5/2

Do you expect O_2^+ to be paramagnetic? Explain your answer.

It has an unpaired electron (in the π* level) so will be paramagnetic

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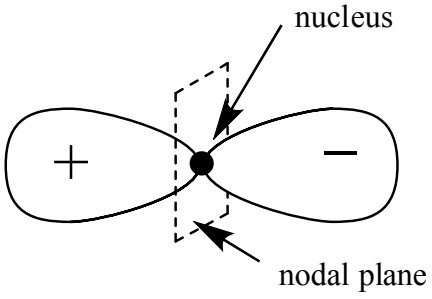
- Sketch the following wave functions as lobe representations.

(a) a 2*p* atomic orbital



(b) a σ* molecular orbital