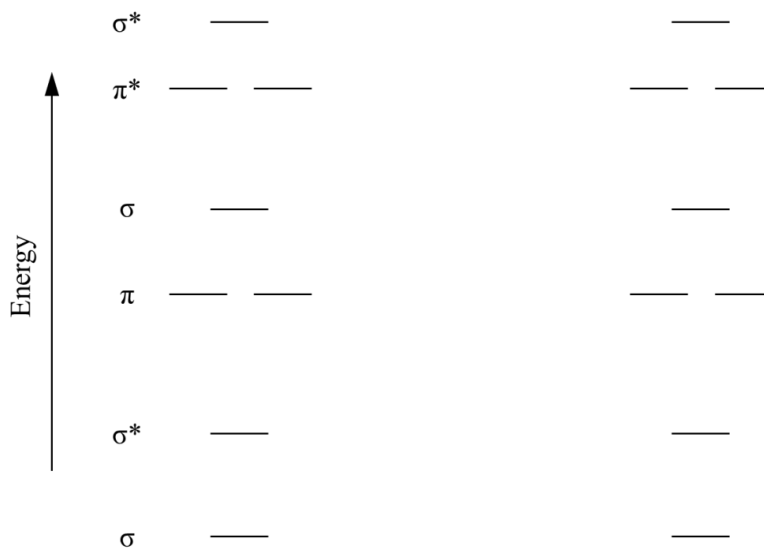


- Oxygen exists in the troposphere as a diatomic molecule.

Marks
4



- (a) Using arrows to indicate relative electron spin, fill the left-most **valence** orbital energy diagram for O_2 , obeying Hund's Rule.
- (b) Indicate on the right-most **valence** orbital energy diagram the lowest energy electronic configuration for O_2 which has no unpaired electrons.

Suggest a heteronuclear diatomic species, isoelectronic with O_2 , that might be expected to have similar spectroscopic behaviour.

The blue colour of liquid O_2 arises from an electronic transition whereby one 635 nm photon excites two molecules to the state indicated by the configuration in (b) *at the same time*. What wavelength photon would be emitted by one molecule returning from this state to the ground state?

Answer: