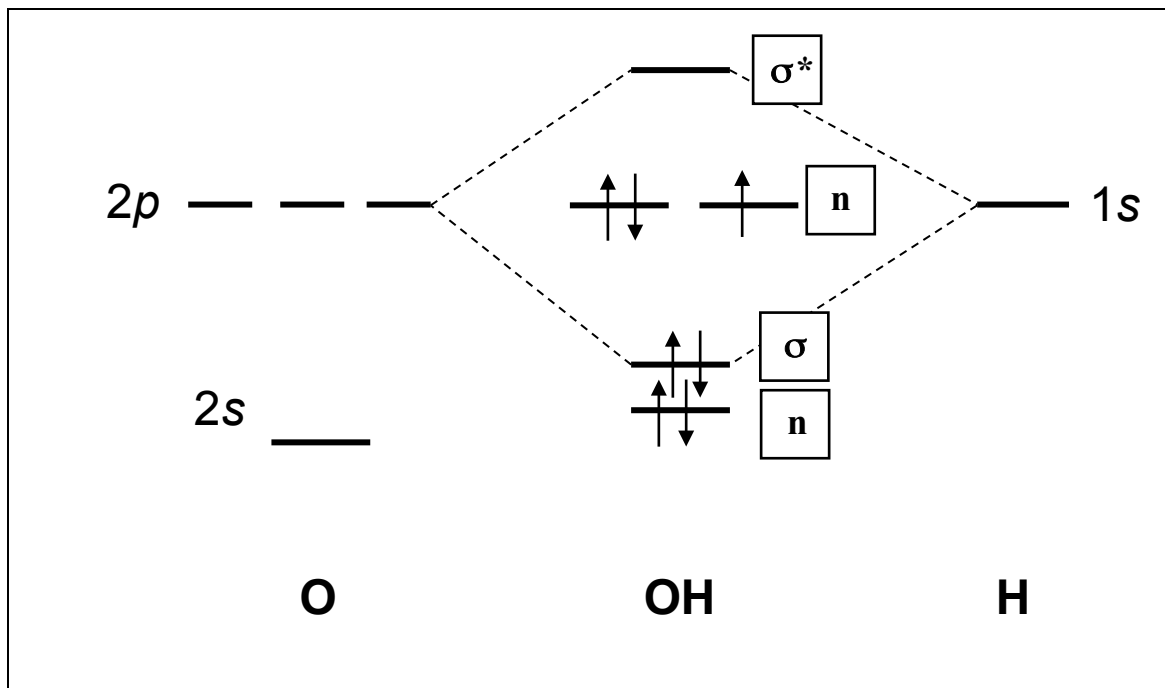


- The OH radical is the most important species in the atmosphere for removing pollutants. A molecular orbital diagram of this species is shown below. Core orbitals are omitted.

**Marks**  
**8**



Using arrows to indicate electrons with their appropriate spin, indicate on the above diagram the ground state occupancy of the atomic orbitals of O and H, and of the molecular orbitals of OH.

In the provided boxes on the above diagram, label the molecular orbitals as  $n$ ,  $\sigma$ ,  $\sigma^*$ ,  $\pi$ ,  $\pi^*$ , etc.

What is the bond order of the O–H bond?

**There are 2 bonding and no anti-bonding electrons. The bond order is 1.**

Why do we call OH a “radical”? How does the MO diagram support this?

**It has an unpaired electron in a non-bonding orbital. This electron is found in the higher energy n orbital on the above MO diagram**