Marks

Oxidation of the Mo complex by **two** electrons gives rise to a paramagnetic species in which the Mo–Mo distance increases significantly. Give a reasonable hypothesis for the bond-lengthening phenomenon. **2**

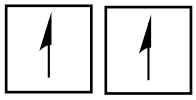
If two electrons are removed, they will come from the bonding orbitals in 2014-N-4 and probably from the δ orbitals. As bonding electrons are removed, the Mo-Mo bond will be weakened. There will 8 bonding electrons remaining:

bond order = ½ (number of bonding electrons – number of antibonding electrons)
= ½ (8 – 0) = 4

As the bond is weaker, it is longer.

Determine the number of unpaired electrons in the oxidised Mo complex.

2 electrons remain in the δ orbitals. In accordance to Hund's rule, these occupy separate orbitals with spins parallel to minimise repulsion:



There are 2 unpaired electrons.

THE REMAINDER OF THIS PAGE IS FOR ROUGH WORKING ONLY.