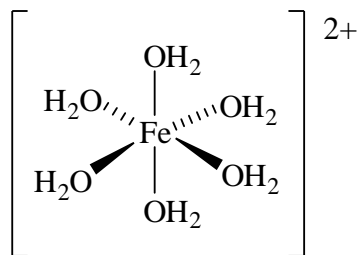
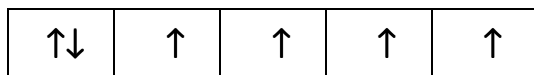


- Dissolution of iron(II) chloride in water leads to formation of $\text{Fe}^{2+}(\text{aq})$ and $\text{Cl}^{-}(\text{aq})$ ions. Draw a picture of the complex ion present, clearly showing the stereochemistry and which atoms are bonded to the Fe(II) ion.



This complex is paramagnetic. Using the box notation to represent atomic orbitals, account for this property.

Fe is in group 8: it has 8 valence electrons. Fe^{2+} has lost 2 so has $(8 - 6) = 2$ electrons: d^6 . These are arranged in the 5 available d orbitals to maximize the number of unpaired electrons and so minimize the electron – electron repulsion, as shown below.



Paramagnetism occurs whenever there are unpaired electrons.

Solutions containing the $\text{Fe}^{2+}(\text{aq})$ ion are acidic. Account for this property and write the chemical equation for the reaction that leads to this acidity.

Fe^{2+} has a reasonably high charge density and this polarises the Fe–OH₂ bonds. This in turn weakens the O–H bonds and leads to H^+ being released.

