Answer on Question #56732 - Chemistry - Inorganic Chemistry

Question:

When Cr2+ is linked with a strong–field ligand to produce an octahedral complex, the ion has two unpaired electrons. When it is linked with a weak–field ligand, the ion has four unpaired electrons. In contrast, the complex resulting from Cr3+ always has three unpaired electrons regardless of the nature of the ligand. Explain.

Answer:

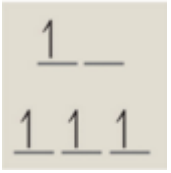
Let's take a look at electronic configurations of these ions in different fields:

Cr^{2+}

strong field

Two of four electrons are paired due to high difference between two levels

weak field



All of four electrons are non-paired

Cr^{2+}

strong field

weak field

All three electrons are non paired in any field