

Absorption Studies of $\text{Co}(\text{H}_2\text{O})_6^{2+}$ and Pressure-Dependent Luminescence Studies of $[\text{M}(\text{bpy})_2\text{Pt}(\text{SCN})_4]$ Complexes

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Spectroscopic studies of transition metal complexes provide important information regarding their applications and potential uses. Absorption spectroscopy identifies a complex's electronic transitions; luminescence provides information regarding the HOMO-LUMO gap, whereas Raman spectroscopy provides information regarding the complex's vibrational states.

Previous work demonstrated that the double maxima observed in the absorption spectrum of $\text{Ni}(\text{H}_2\text{O})_6^{2+}$ resulted from the crossing of electronic states close in energy. To further explore this phenomenon, the absorption spectrum of $\text{Co}(\text{H}_2\text{O})_6^{2+}$ was studied. Literature precedence indicates discrepancies in the assignment of the electronic transitions. Solution and single-crystal absorption spectra indicated that the second band of low intensity correlated to the two electron excitation ${}^4\text{A}_{2g} \leftarrow {}^4\text{T}_{1g}$ instead of ${}^4\text{T}_{1g}(\text{P}) \leftarrow {}^4\text{T}_{1g}(\text{F})$. B value calculations supported this assertion.

In contrast to octahedral $\text{Co}(\text{H}_2\text{O})_6^{2+}$, $[\text{M}(\text{bpy})_2\text{Pt}(\text{SCN})_4]$ complexes are square planar. Pressure-dependent luminescence was conducted on these compounds and their solvated analogs to determine the effects. These complexes were unique as they contained both red and blue shifts within the same complex. The effects of solvent and metal type on luminescence will also be discussed.

A discussion of the utility of spectroscopic methods in understanding the properties of metal complexes will be presented.