Synthesis and Characterization of the Cobalt (III) Complexes:
[Co(NH₃)₆]Cl₃, [CoCl(NH₃)₅]Cl₂, and [Co(NH₃)₅(H₂O)]Cl₃

Brittany Fonner

Cobalt is known to form compounds where the oxidation state of cobalt is predominantly two or three. Cobalt (III) coordination compounds can be synthesized using CoCl₂•6H₂O, which is a cobalt (II) compound. Some cobalt (III) compounds of interest are [Co(NH₃)₆]Cl₃, [CoCl(NH₃)₅]Cl₂, and [Co(NH₃)₅(H₂O)]Cl₃. This paper and presentation will delve into the synthesis and characterization of these compounds, including the overall reactions involved in their synthesis, a detailed look at the electronic properties, and methods used to account for the purity of the compounds. The electronic properties can be deduced using VESPR model and Molecular Orbital Theory, while the purity of the compounds can be done using a spectral analysis, including UV-vis and IR spectroscopy.