

## **REPORT - Cobalt Ammine Complexes**

1. Write a balanced equation for the preparation of each of the complexes.
2. Calculate the percent yield of each of the complexes.
3. Decide, on the basis of the infrared spectra, which isomer of  $[\text{Co}(\text{NH}_3)_5(\text{NO}_2)]\text{Cl}_2$  is N-bonded and which is O-bonded. Explain how you arrived at your conclusion.
4. The visible absorption spectra of the complexes are provided. Calculate the d-orbital splitting in kJ for each complex from the position of  $\lambda_{\text{max}}$ .
5. On the basis of your calculations from question 5, arrange the ligands  $\text{H}_2\text{O}$ ,  $\text{NH}_3$ ,  $\text{Cl}^-$ , N-bonded nitrite, O-bonded nitrite in order of increasing ligand field strength. Provide an explanation of the rationale that you used to arrive at your sequence.
6. Explain, to the extent possible with the compounds that you made, how one might tentatively arrive at a sequence of ligand field strengths based on the colors that you observed.