Chloropentaamminecobalt(III) chloride

$[Co(NH_3)_5Cl]Cl_2$

10 g of ammonium chloride is stirred with 30 ml of concentrated ammonia in a 100 ml conical flask for 10 minutes. A solution of 5 g of cobalt(II) chloride hexahydrate in 5 ml of water is added. Now 2 ml of 30% hydrogen peroxide is added and the conical flask is shaken (vigorously) for three minutes. This addition of 2 ml of hydrogen peroxide and shaking of the conical flask is repeated three times, and the reaction mixture is transferred to a 250 ml beaker and stirred at room temperature for 15 minutes. 35 ml of concentrated hydrochloric acid is added drop wise while the mixture is stirred, and after this addition, the mixture is heated while still stirred - OBS be careful: bumping may occur - until it boils for about three minutes. Cooling in the air results in purple crystals, which are separated using a glass filter funnel. The crystals are washed with 15 ml of 4 M hydrochloric acid and then with 96% ethanol and dried in the air at room temperature.

Nitritopentaamminecobalt(III) chloride

$[Co(NH_3)_5ONO]Cl_2$

2 g of chloropentaamminecobalt(III) chloride is dissolved in 35 ml of water plus 2.5 ml of concentrated ammonia by heating in a 100 ml conical flask. After cooling the solution is filtered (if necessary) and the solution is carefully neutralised with dilute hydrochloric acid (use indicator paper to follow pH). 2.5 g of sodium nitrite is dissolved in the solution by vigorous shaking the flask and then 2 ml of 6 M hydrochloric acid is added to the solution drop wise while gently stirred. The red precipitate is further stirred gently for an hour in the reaction mixture while cooled at 10 ^oC (tap water) and the crimson (red) crystals are separated using a glass filter funnel, washed with 5 ml of cold water and then with 96 % ethanol and finally dried in the air on the filter

Record an IR spectrum (2 % in a KBr tablet)

Nitropentaamminecobalt(III) chloride

$[Co(NH_3)_5NO_2]Cl_2$

2 g of chloropentaamminecobalt(III) chloride is dissolved in 20 ml of water plus 2.5 ml of concentrated ammonia by heating in a 100 ml conical flask. The solution is filtered (if necessary) and acidified with dilute hydrochloric acid and 2.5 g of sodium nitrite is added. The mixture is heated on a water bath until the red precipitate has disappeared. After cooling the solution, 30 ml of concentrated hydrochloric acid is added carefully while gently stirred. After cooling the yellowish brown crystals are separated using a glass filter funnel and washed with 10 ml of 6 M hydrochloric acid and then 10 ml of 96 % ethanol and finally dried in the air on the filter

Record an IR spectrum (2 % in a KBr tablet)

Report : Yield of dry samples (in g and %) and compare the IR spectra.