Mossbauer Study of the xCr2O3-(1-x)α-Fe2O3 nanoparticles system. SEAN KRUPA, MONICA SORESCU, Duquesne University — The xCr2O3-(1-x)α-Fe2O3 nanoparticles system was synthesized hydrothermally for x=0.0 to x=0.9. Mössbauer spectroscopy was performed on the obtained samples as well as for samples subjected to thermal annealing at 550 C for one hour. At x=0.1, the as obtained samples began showing superparamagnetism and became completely superparamagnetic after x=0.4 concentration. The percent of the sample that was superparamagnetic increased with Cr2O3 substitution. This correlates with chromium decreasing the particle size of the powder. The thermally annealed samples appeared to have the hematite structure re-grown for concentrations x=0.1 to x=0.4 with the intensity of the hyperfine magnetic field decreasing with Cr2O3 concentration. For x=0.5 to x=0.9, the percent of superparamagnetic particles increased with Cr2O3 concentration, dominating the system by x=0.8. This system is believed to have applications in gas sensing and catalysis.