

A Novel Solution Reaction of Hexahydroferrate(4-) with Iron(II) That Produces Iron Particles

This report is the description of a reaction that produces iron(0) from the room temperature reaction in THF solution between $[\text{MgX}(\text{THF})_2]_4[\text{FeH}_6]$ ($\text{X} = \text{Cl} \ \& \ \text{Br}$) and FeCl_2 . The production of α -iron is demonstrated by powder XRD and Mössbauer spectroscopy. The lattice spacings (d), isomer shift (δ), nuclear quadrupole (ΔE_Q), and magnetic hyperfine (H_{hf}) parameters determine that the material consists of the bcc phase of iron.

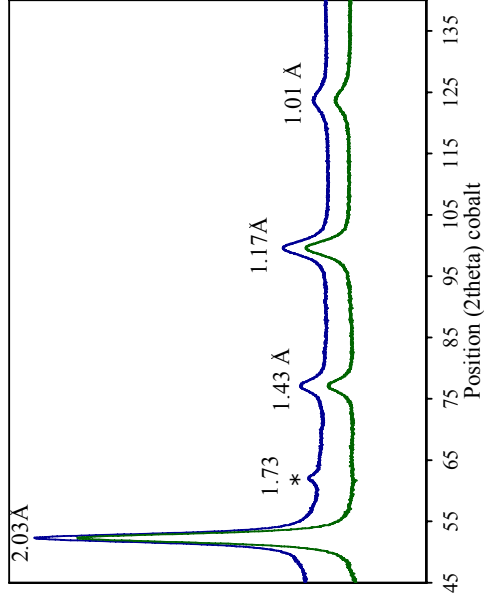


Fig. 1. XRD pattern (upper trace) of intensity vs. position prepared iron sample sealed with a Mylar barrier over glass. The lower trace of blank Mylar over glass subtracted from the upper trace offset to shows a 1.73 Å artifact. Intense low angle reflections are outside the region of interest

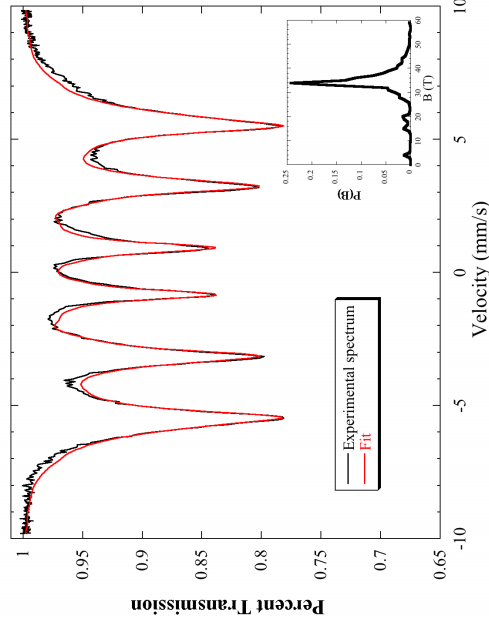


Fig. 2. Mössbauer spectrum at 78 K of iron sample from reaction prepared using $^{57}\text{FeCl}_2$ (black solid line) and simulation (red solid line). Inset shows the magnetic hyperfine field distribution profile from 0 to 60 Tesla obtained from NORMOS-90 simulation. (see Supporting Information for Mössbauer parameters)