The Effect of Mechanical Activation on the Synthesis of $MgFe_2O_4$ from Mixtures of $MgCO_3 \cdot Mg(OH)_2 \cdot xH_2O$ and $FeC_2O_4 \cdot 2H_2O$

Vittorio Berbenni, Amedeo Marini, Chiara Milanese, and Giovanna Bruni

CSGI – Unitá Operativa di Pavia – Dipartimento di Chimica Fisica dell'Universitá di Pavia, Via Taramelli 16 – 27100 Pavia, Italy

Reprint requests to Dr. Vittorio Berbenni. Fax: 0039-0382-987575.
E-mail: vittorio.berbenni@unipv.it

Z. Naturforsch. **2008**, *63b,* 1052 – 1056; received May 27, 2008

The synthesis of $MgFe_2O_4$ has been attempted starting from mixtures of $4MgCO_3 \cdot Mg(OH)_2 \cdot xH_2O$ and $FeC_2O_4 \cdot 2H_2O$ by combining mechanical activtion of the mixtures (by high-energy milling) with annealing at temperatures between 673 and 1073 K. TG measurements of mixtures of the precursors have been performed to assess the reaction mechanism, and to determine the minimum temperature where the two binary oxides (MgO and Fe_2O_3) are formed. X-Ray powder patterns of the milled / annealed mixtures have shown that $MgFe_2O_4$ is formed in an amorphous state already upon thermal treatment at 673 K, while annealing of the mixtures (not mechanically activated) at temperatures as high as 1473 K of the mixtures does not lead to the complete formation of $MgFe_2O_4$. The molar specific heat and the Curie temperature of the milled / annealed mixtures have been determined by DSC: $MgFe_2O_4$ is obtained provided that the annealing of the milled mixture is performed at temperatures as low as 873 K. The effect of the annealing temperature on the surface area of $MgFe_2O_4$ has been determined by BET measurements.

Key words: Magnesium Ferrite, Mechanical Activation, Solid State Synthesis, Molar Heat Capacity, Surface Area