

THERMAL DECOMPOSITION OF BARIUM FERRATE(VI) IN AIR

L. Machala, R. Zboril, V. K. Sharma, Z. Homonnay

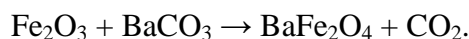
Palacký University in Olomouc, Czech Republic

Thermal decomposition of barium ferrate(VI) (BaFeO_4) in static air was investigated using ^{57}Fe Mössbauer spectroscopy, X-ray powder diffraction (XRD), thermal analysis and microscopic techniques (TEM, SEM). BaFeO_3 was confirmed to be the primary decomposition product above 190 °C. BaFeO_3 was found to be unstable in air at high and/or room temperature reacting with air- CO_2 towards orthorhombic BaCO_3 and supermagnetic amorphous Fe_2O_3 nanoparticles (< 5 nm). The room temperature Mössbauer spectrum of the product of decomposition at 300 °C consists of two components. A singlet ($\delta_{\text{Fe}} = -0.27$ mm/s) corresponds to tetravalent iron atoms in rhombohedral BaFeO_3 structure, while a doublet ($\delta_{\text{Fe}} = 0.35$ mm/s, $\Delta E_{\text{Q}} = 0.56$ mm/s) was ascribed to amorphous Fe_2O_3 . At 600 °C, the solid state reaction between the as-formed Fe_2O_3 and BaCO_3 towards barium ferrite (BaFe_2O_4) nanoparticles (20-100 nm), takes place. The overall decomposition mechanism of BaFeO_4 in air can be described by the following chemical equations:

300 °C:



600 °C:



Presenting author: Libor Machala

**Address: Centre for Nanomaterial Research, Šlechtitelů 11, 783 71 Olomouc
- Holic**

FAX: + 420 58 563 4958

E-mail: libor.machala@upol.cz