

The Solid State Chemistry of the Iron Ammonia Synthesis Catalyst

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The active state of the iron ammonia synthesis catalyst consists of crystallites of bcc iron and oxide promoters. In order to obtain a highly active system it is essential to reduce a fused oxide precursor. Metallurgical bcc iron is a very poor catalyst. The peculiarities of the activation of the fused oxide precursor are investigated by a variety of bulk-structural methods. It emerges that the bcc iron phase is organised in several anisotropic crystallite species. In addition, the activation in synthesis gas leads to the formation of a diluted nitride phase of the interstitial Fe_{18}N type. Its role and the mode of action of the wustite phase in the determination of the activation kinetics and the shape of the bcc iron crystallites will be discussed.