In-situ Neutron Diffraction Studies of the Reduction of a Model of an Oxidations Catalyst (ferric molybdate and bismuth molybdate)
ASHFIA HUQ, R.G. TELLER, J.W. RICHARDSON, E.R. MAXEY, Intense Pulsed Neutron Source, Argonne National Laboratory — Three elements commonly found in metal oxide alkene oxidation catalysts are molybdenum, bismuth and iron. In the case of ammoxidation of propylene to acrylonitrile many catalyst have ferric molybdate and a mixture of bismuth molybdates present in the as-prepared formulations. It is generally recognized that during catalyst activation ferric molybdate is reduced to Fe$^{+2}$ phases, freeing molybdenum oxide for the formation of other phases. It is suspected, but has never been demonstrated, that this excess MoO$_3$ then reacts with the bismuth containing phase(s) to form the active catalyst phase. Although this reaction is generally believed to occur in a number of catalytic processes the mechanism of the reaction has never been extensively studied. Due to the ease of in-situ measurements and the sensitivity to oxygen in the presence of heavy metals neutron diffraction is an ideal probe to study this reaction mechanism. We have developed a reaction cell that can be used in the General Purpose Powder Diffractometer at IPNS, ANL for time resolved in situ study. Recent upgrades to GPPD, which have increased data rates by a factor of 6, now make these measurements possible. Preliminary findings about the evolution of a model oxidation catalyst under reaction conditions will be presented in this talk.

Ashfia Huq

Date submitted: 07 Dec 2004

Electronic form version 1.4