MASTER**DEVELOPMENT OF IMPORTANT MOLYBDENA-ALUMINA
CATALYSTS FOR COAL HYDROGENATION****Final Report
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ABSTRACT

Preparation of molybdena-alumina catalysts was investigated seeking ways of selectively modifying the surfaces of the alumina support, and thus the final molybdena-alumina catalysts. The objectives of this research and the progress made are reviewed herein.

STATEMENT OF OBJECTIVES

This was an add-on program to ongoing research dealing with relationships between the surface chemistry of reduced molybdena-alumina catalysts and catalytic function. Its aim was to see if the basic knowledge being generated in the Principal Investigator's Laboratory could be used in a practical way to develop improved catalysts. The grant has made possible the collaboration of workers in two laboratories, ERDA, Pittsburgh and the Laboratory for Surface Studies, UWM, and the combination of their facilities to this end.

PROGRESS

The present award became effective on March 15, 1977, rather than January 1, 1977. Facilities for catalyst preparation were set up at UWM, including a source of very pure H_2O . Methods of catalyst preparation were evaluated and a method selected for routine work. This followed from some recent studies of Mars and co-workers and employed a flowing stream of solvent plus salt to be impregnated. The stream was flowed through the bed of alumina until the exit stream became identical with the entrance stream.

In this way, the entire bed became saturated to monolayer capacity, and all parts of the catalyst were uniformly covered. The surface concentration could then be lowered, again to a fixed level, by desorption into a stream of pure H_2O ; this could be employed at increasing temperatures to effect greater and greater removal of "excess" molybdena (or other salt). We hope to use this technique to both modify the alumina surfaces with site selective ions such as Ga^{+3} , Ge^{+4} (tetrahedral preference) and Ti^{+4} (octahedral preference). We also wish to see if we can distinguish differences between these ions (which we believe should form epitaxial layers grown onto the alumina surface) and more basic cations such as Ni^{+2} or Co^{+2} (which may more easily penetrate into the alumina lattice, perhaps many layers deep).

Aliquots of our first preparations were sent to Dr. A.J. Perrotta, ERDA, Pittsburgh for further characterization there.

Apparatus for catalyst characterization using chemisorption techniques was constructed.