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Subject: Monthly Highlights for December, 1970,
Chemical Engineering Department

Sodium-Sulfur Battery

The preparation of the demonstration battery has continued to be the major area of activity. Sixty more tubes of 0.7% Li_2O composition have been pressed and twenty-seven of them have been sintered. The straightness specifications on the tubes have become tighter during the last month because of difficulties encountered in filling cells with pre-cast sulfur blocks. All tubes are now sintered in sealed platinum-rhodium containers which result in straighter tubes than those sintered in large unsealed vessels with packing powder.

Promising techniques are being developed for sealing the conductive ceramic to alpha alumina structural parts and the alpha alumina to stainless steel.

Lead-Acid Battery

The processing conditions necessary to produce a needle-like crystal structure in positive paste electrodes have been more firmly established. X-ray diffraction analyses have shown that a major phase of

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tetrabasic lead sulfate is formed in these pasted grids during a curing period (6 to 10 hours) that is about one-tenth of the present production curing time. These pastes are electrochemically oxidized to lead dioxide having the desirable tetragonal lattice structure.

Limited cell cycling data with early experimental electrodes, containing tetrabasic lead sulfate on Pb/Ca-Sn grids, indicate that deep charge-discharge cycling life can be increased significantly - over seven times that of production plates in one case. Shedding of the active material from the grid, which is observed in the case of production electrodes, was not evident with the experimental electrodes. However, the active material utilization was less than for production electrodes. Recently prepared samples, which are now at an early stage of cycling, indicate an improved material utilization, and processing studies are continuing to optimize this characteristic.

Air Pollution from Brake Lining Asbestos (with Mechanical Research Dept.)

Professor I. J. Selikoff, M.D., a recognized expert in the field of asbestos air pollution, and his colleague, Dr. W. Nicholson, visited our laboratory on November 23. They are associated with the City University of New York's Mount Sinai School of Medicine. We discussed with them our experiments to sample and to examine for asbestos fibers the airborne wear dust generated on a brake dynamometer. Our experimental set-up and air sampling procedure were explained, and attention was focused on techniques for the preparation of the air filter samples for electron microscope examination. The techniques used to date by our Technical Services Department

and at the Environmental Sciences Laboratory of the Mount Sinai School of Medicine were discussed. Drs. Selikoff and Nicholson suggested that with one of their techniques, there is less likelihood that asbestos fibers would be missed due to concealment by other particles than with our methods.

Portions of our filter samples have been transmitted to Professor Selikoff, who has agreed to examine them, and Dr. E. Eichen plans to visit their laboratory to observe their technique. Thus, comparison of asbestos fiber findings at both laboratories and using different sample preparation techniques will be possible. Technical Services Department also plans to check out electron microscope instrumentation which might allow fluorescent elemental analysis of particular suspicious looking particles, leading to positive identification of asbestos fibers.

Professor Selikoff was receptive to the idea of joining us in eventually publishing the results of this work after participating in the examination of our samples and the interpretation of the results.

Exterior Surface Finishing Committee

Due to the more stringent requirements for plant effluents, substitutes for the chromic acid rinse at the end of the zinc phosphating line are being sought. Continued use of the present rinse would require costly chromium treatment facilities. Chemical Engineering is assisting the committee in the evaluation of several possible substitutes. Three procedures recommended for evaluation have been incorporated into a test program: (1) heat treatment of phosphated parts at 350°F, (2) substituting of the markedly less toxic molybdic acid for chromic acid, (3) use of an

organic phosphoric acid based inhibitor recently developed by Turco Products. Amchem's new chromate-free rinse is also being evaluated. The test program is in progress at MDC and the more promising processes will be evaluated using production facilities.

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