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June 17, 1980

TO: Charles Grua

FROM: Amos S. Newton, Phyllis Fox, and Hector Villarreal

RE: May Monthly Progress Report
Environmental Effect and Controls for Coal-Water Systems
LBID-238

Efforts have been made to determine whether polar compounds such as phenols are present in coal slurry water. Phenols, cresols, and other polar compounds are not readily extracted directly from water. The distribution coefficients are not favorable for the extraction of polar compounds from water by solvents such as hexane. In order to improve the situation, attempts have been made to convert phenol present as a dilute solution in water to phenyl methyl ether (anisole) by methylating it with dimethyl sulfate--the only methylating agent available which will work in water solution.

Our experiments demonstrated that the extraction of anisole from water by hexane is fairly efficient with yields greater than 60 percent. Attempts to concentrate the extracted anisole by vacuum evaporation of the hexane were less favorable owing to the volatility of anisole (B.P. 153°C). This can be improved by use of pentane or ether as the extractant or by use of a small distillation apparatus for concentration.

Less favorable, however, was the low yield of anisole from phenol when the phenol was present at concentrations less than 10 ppm. The yield of anisole, even using a large excess of dimethyl sulfate reagent, was a disappointing 5 percent. This yield may be improved slightly by reducing the temperature of methylation to near 0°C.

FUTURE PLANS

Methylation and colorimetric methods will be tried for phenol determination both with and without a phenol or a

deutero-phenol being added to the water before a coal slurry is prepared. Other types of compounds will be checked for their behavior with coal slurry. The behavior of a bituminous coal will be compared to the sub-bituminous coal we have been using in regard to the purity of the coal slurry water.

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