

proximately 10 times more surfactant is required for complete inhibition on pyritic coal substrate. Specifically, Kleinmann observed that about 25 mg/L of SLS stopped bacterial activity; LAS and alpha olefin sulfonate required about twice that concentration to be equally effective. Olem et al. used equal concentrations (50 mg/L) of SLS and LAS in their columns. Thus, LAS was used at about the threshold concentration for complete inhibition; their results may simply reflect that higher concentrations of LAS are required to equal the effectiveness of SLS. Since LAS is significantly cheaper than SLS, this requirement may not be an obstacle to its use. We have recently started full-scale field tests using LAS at sites where acid hydrolysis of SLS could be a problem.

As a result of previously published articles (14,15) there are over 50 mining companies using anionic surfactant solutions to control acid drainage, with varied success. A procedural guide on the use of the anionic surfactant technique is now in press, and should be available by December, 1983.

APPENDIX.—REFERENCES

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Closure by Harvey Olem⁶

The writers would like to thank the discussers for providing an update on Bureau of Mines field tests conducted since preparation of the paper. It should be noted, however, that all our work concerned coal in storage, while the discussers' field tests were with refuse material, a waste product of coal. The properties of coal refuse and coal are different, and the results of field tests with coal refuse may not be directly applicable. Also, coal refuse is a waste material to be disposed of, while coal must eventually be used in industrial applications. A new set of questions must be answered in future field trials, such as the burning characteristics of

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treated coal, the effects on boilers and ancillary equipment, and the characteristics of stack gases. We are now seeking to conduct such a test at the coal pile of a southeastern U.S. power plant.

The discussers' remarks regarding the relative effectiveness of sodium lauryl sulfate and linear alkylbenzene sulfonate are well taken. In fact, further studies are in progress in our laboratory on their relative effectiveness in correcting an existing acid drainage problem at coal storage piles, and we plan to apply higher dosages of the latter detergent.