CALCIUM CARBONATE SCRUBBING OF HYDROGEN CHLORIDE IN FLUE GASES

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This is an interesting laboratory and bench scale study. However, until it is extended to a full scale pilot operation, the results will have limited value. I feel it is particularly inappropriate to jump from the limited scope of the studies described in this paper to comparisons of annual reagent costs as contained in Fig. 5. Obviously the concepts contained in this paper require further, orderly, development before they are ready for full-scale application, and before one can make such cost projections with any degree of confidence.

Discussion by

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The paper, entitled "Calcium Carbonate Scrubbing of Hydrogen Chloride in Flue Gases" and prepared by Bell et al., is an interesting research discussion of presently limited commercial potential. Unless the resource recovery industry is required to increase acid gas emissions control to more stringent levels than is currently in effect, the use of wet scrubbing technology in this field is highly unlikely. Wet scrubbers have higher capital investment, operating and maintenance costs than dry technology acid gas control systems. However, wet scrubbers can achieve higher acid gas control efficiency with lower reagent stoichiometric requirements.

Today, preferred acid gas treatment facilities are either dry or semi-dry lime injection systems with high efficiency particulate control devices such as fabric filters or electrostatic precipitators. During the mid 1970's EPA funded a limited research program by Research–Cottrell at Rickenbacker Air Force Base to demonstrate that calcium carbonate sludge from waste water treatment facilities could be a good low cost reagent for sulfur dioxide removal. That program successfully demonstrated the use of waste calcium carbonate sludge. This work further confirms these prior studies.

Calcium carbonate sludge has been found to be more reactive than fine ground limestone and hydrated lime. The most interesting part of this study might be from the financial/waste disposal standpoint. Many municipal water treatment plants utilize lime addition as a water softener, and are faced with the cost and inadequate land fill area to dispose of the resulting calcium carbonate sludge. Some of these municipalities are also building resource recovery facilities. If the calcium

carbonate sludge could be used as the reagent for a spray dryer type of acid gas control system, the municipality would obtain a significant financial benefit. It is important to note that the use of fine-ground calcium carbonate has been tried as reagent in the past and found not to be reactive enough for this type of application. However, the authors of this study might want to consider investigating the use of waste calcium carbonate sludge as the reagent in a spray dryer type of technology because the waste sludge has a much finer pore structure and higher surface area. It could, therefore, prove to be an acceptable and more cost-effective alternative reagent.

Discussion by

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This paper focusses on the use of process-precipitated calcium carbonate sludge as a reagent for removal and neutralization of HCl when scrubbing combustion gases from hazardous waste incinerators burning chlorinated materials. Tests were performed by the authors using $CaCO_3$ sludge, which is precipitated directly from solution in a water softening process, hence is a waste product, the cost of which is mainly handling and transportation. They found that it was considerably more cost-effective than caustic, lime and crushed limestone, and has the advantages of high specific surface area and reactivity, as well as providing stable pH control. All of the reagents could meet the RCRA requirement of 99.9% control of HCl.

To those not familiar with the practical chemistry of scrubbing reagents, this paper is extremely valuable in pointing out the importance of pH control, the difficulty in controlling it with strong acids and strong bases, and the benefits of using weak bases. The ability to operate with pH of 6 or less should make the metallurgy of the equipment easier to deal with.

Perhaps the authors could provide more information on the availability of this sludge. Is there a good match between supply and potential demand within a reasonable shipping area? How is it handled, shipped and used at the site?

Another question: Would calcium carbonate sludge be a suitable material for MSW scrubbers which have not only HCl but also SO_2?

Finally, is this material actually being used for this purpose?

The authors are to be commended on this well-executed research project and their excellent presentation.