METHYL BROMIDE SCRUBBING TECHNOLOGY DEVELOPMENT

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The removal and destruction of methyl bromide from a fumigation air stream requires acceptance of several constraining issues and specifications. These must be addressed in an economically viable framework. Granted that methyl bromide applications are decreasing, the law of diminishing returns seems to be telling the industry that the time may be right for new removal technology to protect the ozone layer for those applications where alternatives to methyl bromide are not suitable like QPS.

Methyl bromide's reactivity is both its most beneficial attribute with respect to fumigation efficacy and its Achilles heel with respect to environmental impact. When used as a fumigant, methyl bromide can interrupt an organism's internal chemical reactions thus shutting down the organism. In the upper atmosphere, it reacts with ozone destroying its ability to provide protective filtering of UV light from the sun. If one destroys methyl bromide, post fumigation, by passing it through an environmentally benign scrubbing solution then the ozone layer can be protected and environmental concerns are addressed. The objective here is to deliver the promise of a capture and destroy system that can be bolted on to existing fumigation operations without disrupting them.

An ideal system for scrubbing methyl bromide should have the following attributes:

1. Ambient temperature (5 to 15^{o}C) operation.
2. Simple straightforward operation requiring no incremental labor.
3. Off the shelf components - no special or expensive equipment.
4. One pass operation - straight through removal without air recycling.
5. Reliable instrumentation system to quantify removal efficiency in real time.
6. An independent sampling method to verify methyl bromide destruction.
7. Portable to various locations.
8. 1/2 hour set up and shutdown post fumigation.
9. Easy (non-hazardous) and cheap disposal.

The technology we use is based on phase transfer catalysis (or PTC) whose salient feature is to bring reactants from different phases together to react. In this case, PTC can facilitate the reaction of methyl

bromide with the appropriately chosen water soluble anion, thus destroying methyl bromide's toxicity.

Value Recovery has done a significant amount of development work over the last year to support the design of a system with the attributes described. A data acquisition system to measure real time methyl bromide concentrations was designed and built with IR sensors that gave an accuracy to of 5% and a precision (standard deviation) of 1.2% for measuring feed concentrations of calibration gas in the 15,000 ppm range. A small scale laboratory scrubber was built to handle 30 liters/min of methyl bromide laden air in the company's walk-in hood located in Bridgeport, New Jersey. Removal efficiencies for this small scale system peaked at 95% and are explainable in terms of normal gas-liquid mass transfer theory (that will not be discussed).

The engineering design challenges coupled with actual results from small scale tests will be presented. An analysis of the commercial issues for large scale QPS based on this approach will also be briefly discussed.

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