

NEW DESIGN FOR ZEOLITE-BASED RECAPTURE

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The ability of zeolite to adsorb and then desorb methyl bromide using temperature swing has been well established in laboratory tests in Toronto, Canada, and field tests in Wenatchee, Washington, and in Kalinka, near Santiago, Chile. The innovative new design developed by Cryo-Line/Knowzone separates collection from recovery. The collectors are a series of stainless steel cylinders that contain enough zeolite to adsorb 25 pounds of methyl bromide. Each collector comes with its own airtight blower that will direct the methyl bromide-impregnated airstream onto the sieve where the methyl bromide will be collected. If a fumigation takes place in a trailer using three pounds of gas then a collector can do eight fumigations before it needs to be desorbed. If a full fumigation chamber needs 150 pounds of gas then six collectors can be connected in series to the existing exhaust system from the fumigation chamber and thereby collect the gas being exhausted at the end of the fumigation. Regardless of the size or type of fumigation being conducted (with the exception of soil fumigation) this system is designed to have an adequate volume of sieve at the fumigation site so that the methyl bromide can be recaptured. These collectors can then be transported to the reclamation site where the reclamation unit uses a temperature swing to desorb the methyl bromide and then purifies and tests it before rebottling in a format that the fumigators are accustomed to working with.

The totally redesigned reclamation unit is the centerpiece of the Cryo-Line/Knowzone methyl bromide reclamation system. The system is eight feet long, six feet wide and five feet tall with a total gross weight of approximately 2,000 pounds. All of the piping, valves and metal surfaces that are exposed to methyl bromide is stainless steel. The unit has the capacity to heat methyl bromide to 250° F. and to cool it to -40° F. The unit is easily portable and operates on a 460/3/60 volts of power which makes it suitable for international use. As shown in the schematic, in the first phase the boiler heats the heat exchanger which brings the temperature of the circulating air to 250° F. At this temperature the air being pumped through the collectors causes the methyl bromide molecules to release from the zeolite. The methyl bromide then flows through to the economizer where its temperature drops to 100° F.

In the next phase the methyl bromide passes through a drier and scrubber that removes any water vapour or acid that may have contaminated the methyl bromide during the fumigation process. The methyl bromide then passes on to a condenser where liquid nitrogen is used to lower the temperature of the methyl bromide to 40° F. The condenser separates the methyl bromide from the airstream and it precipitates into a holding tank. The final step is for the methyl bromide in the holding tank to be fed into a canister under vacuum which would return the methyl bromide to the same type of canister that the fumigators are accustomed to. The standard operating procedure will be for samples to be taken of the methyl bromide in the holding tank and have them tested for purity using a gas chromatograph prior to the batch being released for repackaging.

The presentation during the post-harvest session will focus on the results of a continuing testing program demonstrating the flexibility and efficiency of the system.