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# Minimize acid content from reactor exit gases

**Plagued with operating problems from solid benzoic acid accumulation, this Canadian operating facility successfully converted the venturi scrubber into a packed tower/quench unit**

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**A**t a Canadian purified terephthalic acid (PTA) plant, process gas from the main reactor—primarily nitrogen and carbon dioxide—are scrubbed and then used as the transport medium to move product to storage hoppers and other mill services. A venturi scrubber was installed originally to clean up the process gas. Unfortunately, this system suffered from numerous operating problems associated with residual benzoic acid found in the reactor-vent gas. In the system, benzoic acid was sublimating, thus creating problems with downstream equipment.

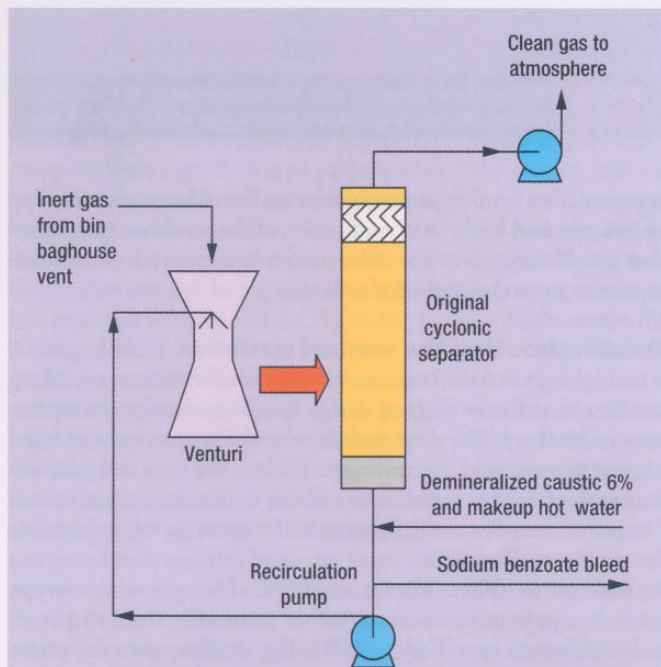
As shown in this case history, the process engineers revamped the scrubbing operation. In place of the venturi, a pack tower and quench unit were successfully installed, which controlled the residual benzoic acid. **Result:** Dramatic improvement in operations of this unit.

## BACKGROUND

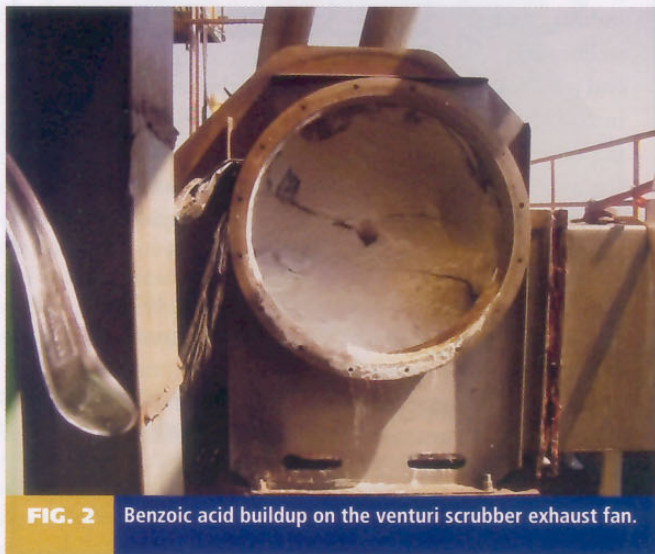
At the Interquisa Canada mill in Montreal, air is used as an oxygen source for the catalytic oxidation of paraxylene and synthesis of PTA in the main reactor. Gases emanating from the main reactor vent consist principally nitrogen, carbon dioxide, residual oxygen and other contaminants. Part of the gases exiting the reactor vent is directed to a turbine for electrical energy production, and the remainder is treated using a catalytic process. The treated gases are washed, dried and used to transport PTA to the product-storage hoppers and other mill services.

These inert gases are filtrated with bag house-type filters. They are then washed via a venturi-type scrubber followed by a cyclone separator to meet volatile organic compound (VOC) regulation for this process.<sup>1</sup> Finally, the inert gases are vented to atmosphere. Various sampling campaigns have confirmed that the main contaminant found in the inert gases exiting the storage-bin bag houses is benzoic acid. Fig. 1 is a process diagram of the wet scrubber originally used for washing inert transportation gases at the Interquisa Canada mill.

During the months following the startup of the gas-washing system, numerous operational problems occurred, in part due to



**FIG. 1** Original design of the venturi scrubber/cyclone unit to clean up inert vent gas from the terephthalic acid silos.



**FIG. 2** Benzoic acid buildup on the venturi scrubber exhaust fan.