VCM waste is not for burning

Fluid-bed catalytic oxidation unit at Goodrich plant destroys waste hydrocarbons, saves energy and recovers chlorine

B.F. Goodrich Chemical has turned its back on high-temperature incineration, a method that has been working well for destruction of hard-to-dispose-of chlorinated hydrocarbon wastes. It has switched, instead, to an in-house-developed fluid-bed catalytic oxidation unit to process the 25 million lbs./year of chlorinated hydrocarbon wastes generated at its 1-billion-lbs./year vinyl chloride monomer plant at Calvert City, Ky. And the company, which has been operating the new unit since July, has some impressive figures to support the advantages of the switch.

Direct energy savings, based on comparison with the incineration system the company had been using, total 14 million Btus./hour. Moreover, the process, called Catoxid, recovers most of the chlorine value in the by-products.

The process technology, which Goodrich will license, offers other chemical companies that have chlorinated hydrocarbon waste problems a new disposal alternative. In the U.S., production of more than 10 million tons/year of chlorinated hydrocarbons for products such as vinyl chloride, chlorinated solvents and insecticides, generates some 380,000 tons/year of wastes. And traditional routes—land dumping, ocean disposal and deep-well injection—have been almost completely closed by environmental control legislation.

Until now, most companies have gone to incineration as an alternative disposal method. For example, Monsanto uses a John Zink (Tulsa) high-temperature unit to dispose of its polychlorinated biphenyl wastes at its Sauget, Ill., plant. And the Hooker incinerator at Niagara, N.Y., can generate 2,600 F for destruction of chlorinated hydrocarbon waste streams.

But Goodrich didn't want to merely destroy the unwanted hydrocarbons from its only VCM plant; its goal was energy savings and chlorine recovery.

Meeting the Goal: Stanley Farbstein, the company's manager of energy and raw materials, reports that direct energy savings at the plant with the new unit are equivalent to 24,000 bbls./year of oil, and chlorine-value recovery indirectly adds savings of some 60,000 bbls./year of oil.

The hydrogen chloride produced in the oxidation of hydrocarbon waste at the plant is equivalent to about 9,000 tons/year of chlorine, according to Farbstein. And since the Federal Energy Administration estimates 38 million Btus. are required to produce a ton of chlorine, Goodrich figures energy savings of 342 billion Btus. from its chlorine recovery.

Direct energy savings, compared with incineration, show a net advantage of 18,000 lbs./hour of steam.

One of Two: Goodrich is the first to put a catalytic oxidation unit to use for chlorinated hydrocarbon wastes, but it is not the first to tout this type of system for the wastes. Lummus, which developed the Transcat process in 1971 for production of vinyl chloride from ethane, has been offering it for chlorinated hydrocarbon wastes and production of other chlorinated hydrocarbons, aldehydes, ketones, acids and nitriles (*CW, July 26, 1972, p. 61*). A Transcat unit is due onstream in late 1975 at Shinetsu Chemical Industry's chloromethane plant in Naoetsu, Japan.

Transcat uses molten salts of a multivalent metal (e.g., a mixture of copper chlorides) for three functions: as catalyst, heat-transfer agent and reactant. In this system the waste stream is incinerated before the gas is contacted with the catalyst and air at about 600 F.

Goodrich's Catoxid system is based on fluid-bed technology similar to that the company uses in oxychlorination units. The company, which has applied for patents and has licensing agreements pending, is not ready to disclose process details or the catalyst that is used.

In the system, by-products from chlorinated hydrocarbon production are fed to a reactor. They enter at the bottom, where the mixture is fluidized with air. The air and chlorinated by-products react to form hydrogen chloride, carbon dioxide, carbon monoxide and water. Heat from the exothermic reaction is used to generate steam, which is fed to the plant's steam distribution system. Hydrogen chloride is returned to the VCM operation.

Operating temperatures and pressures are "mild and moderate." The reactor can be made from "engineering alloys," according to John Elder, a Goodrich senior engineer. The only fuel used by the process is during startup operations, and the process economics do not require regeneration of the catalyst, he adds.

Goodrich will not disclose cost details about the system. But Elder indicates there are substantial maintenance savings.

"The incineration unit we had operated well, but it required a lot of maintenance," he says. That unit was a Union Carbide system (*CW, Apr. 19, 1972, p. 37*), installed in 1969.

"Very high temperatures (over 3,000 F) and the corrosive nature of the materials meant the unit wasn't simple to operate," says Farbstein.

Construction costs are said to be competitive with those for incineration units. A Carbide unit costs $500,000 for each 2,000 lbs./hour of chlorinated hydrocarbons to be processed. And a 28,000-tons/year incineration unit built by Nittetu Chemical Engineering in the Netherlands cost some $3.5 million (*CW, Dec. 6, 1972, p. 39*).

With the cost of energy soaring and chlorine in short supply, the Catoxid system could prove valuable for producers of chlorinated hydrocarbons. And it could ease the cost problems of VCM makers who must revamp plants to meet strict air contamination standards within their plants as a result of the discovery of the VCM-cancer link.

New curb on phosphates

Air pollution emission standards for new phosphate fertilizer plants that were proposed last week by the Environmental Protection Agency are aimed chiefly at controlling fluoride emissions.

Although fluorides are not on the list of pollutants for which national ambient air-quality standards have been set, EPA is acting to regulate them under a special procedure authorized in Section 111 (d) of the Clean Air Act of 1970.

In the *Federal Register* notice about the new standards, EPA says the emphasis on fluoride control is necessary because "extensive documented evidence is available describing the injurious effects on vegetation and herbivorous animals" that consumed vegetation contaminated by the fluorides.

The regulations will require that phosphate fertilizer plants install high-efficiency gas scrubbers. Visible opacity standards also are proposed for diammonium phosphate and triple superphosphate units and for storage facilities to control particulate emissions accompanying fluoride gases.

EPA estimates cost of controls at about 1% of sales for triple superphosphate and 0.5% for most other products.

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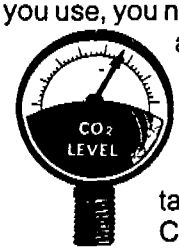

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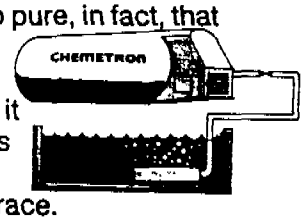

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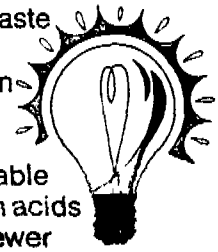

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