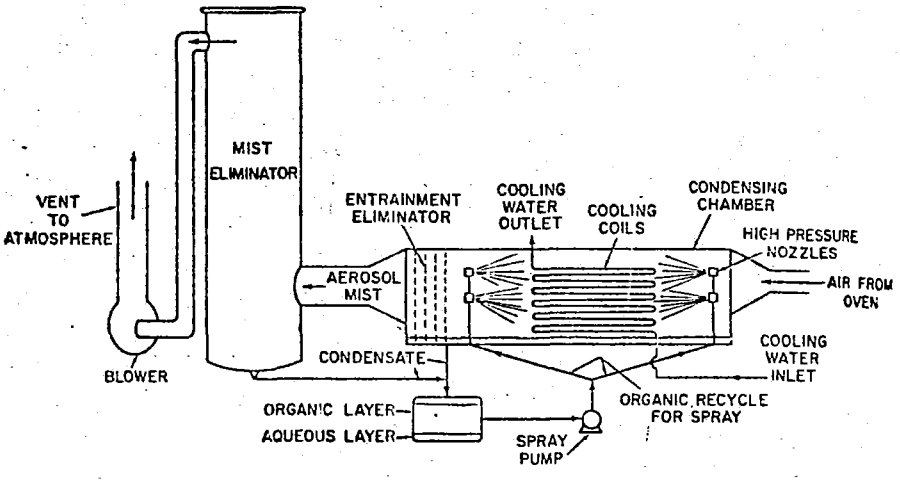
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Plasticizer Vapor Recovery For Air Pollution Control



FLEXIBLE PVC processors will be more concerned with plasticizer recovery as more special air pollution legislation is promulgated through the country. An added advantage to installation of recovery units is the possibility of reusing the volatiles which would otherwise have been lost to the atmosphere according to Eastman Chemical Products Inc. and Clermont Engineering, Inc., codesigners of a new pollutant control system.

Los Angeles County initiated air pollution control legislation (Rule 66) a few years ago. This legislation prohibits the use of certain volatile solvents because they contribute to air pollution. This rule is expected to be the beginning of legislation that ultimately will branch out into other geographical areas.

Some vinyl formulations for calendering plastisol processing and extrusion incorporate plasticizers with volatilities as high as 15% by weight. These materials fall into the "volatile chemicals" category. To simply substitute less volatile plasticizers to reduce pollution (as was done with some solvents to comply with Rule 66) is not always a practical solution, because of the properties required in a particular application. The savings realized in recovery may help justify the use of the more expensive additive.

How the unit works

Basically the unit is based on the condensation of effluent vapor. The Clermont Engineering Co. system, which can reportedly recover about 90% of plasticizer, operates as follows:

1. A sprayed coil system is used to avoid contamination of the cooling water by condensed organics and it is the most efficient heat exchanger for this application. The hot oven gases first pass across this finned coil causing condensation of plasticizer fumes, solvents and water. This liquid condensation forms two liquid phases —usually as an emulsion. This condensate (or emulsion) is recirculated in the spray chamber.

2. High pressure sprays are directed on the cooling coil to increase heat transfer efficiency, to scrub the coil clean, to clean air stream of any dirt and dust carried over from oven gases, and serve to assist in agglomeration of small liquid droplets so that they might be trapped more easily in an eliminator baffle section. At this stage there is approximately 80% removal of air contaminates which still leave an unacceptable discolored stack plume.

3. The final stage of fine particle recovery is accomplished thru a mist eliminator which is a fiberglass packed tower. At this point 90 to 95% of volatalized organics have been recovered, i.e., in a system expelling 300,000 lb/yr, 30,000 would be lost at 90% recovery.

Recovery rates and efficiency of air pollution control are, of course, dependent upon the specific plasticizers and solvent being used, as well as quantity and temperature of cooling water made available.

In addition, recovery of the plasticizers doesn't transfer air pollution to water pollution, which might present even greater problems.

The condensate (generally 3 parts water to 1 part organics) is decanted and sent back to the system. If the material is off-color it can be used for dark colored products, or distilled.

A quick look at costs

Depending on which plasticizer is used (each has a different volatility) a 10,000 cfm unit recovers 270,000/lb/year if the plant runs 8/hr/day, 5 days/wk, 50 weeks/yr. This would require 50 hp for fans and pump. Assuming $20/hp/yr on an 8 hr day, total power costs would be $1000/yr.

Capital costs can vary widely depending on materials of construction, the physical configuration of the unit, and different labor costs in that geographic area. A range for a 10,000 cfm unit might be $125,000-$200,000.

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