

# Smart VOC Recovery Systems

## One Size Does Not Fit All!

Finding the optimal way to handle your vent gas stream effluent requires a company with a portfolio of options – Praxair. Compliance with VOC emission limits, escalating costs of feedstocks and time pressure on expansion projects are among the challenges facing the chemical processing industry today. Praxair knows that what works for one company may not suit another. We will work with you to find what optimizes your operations.

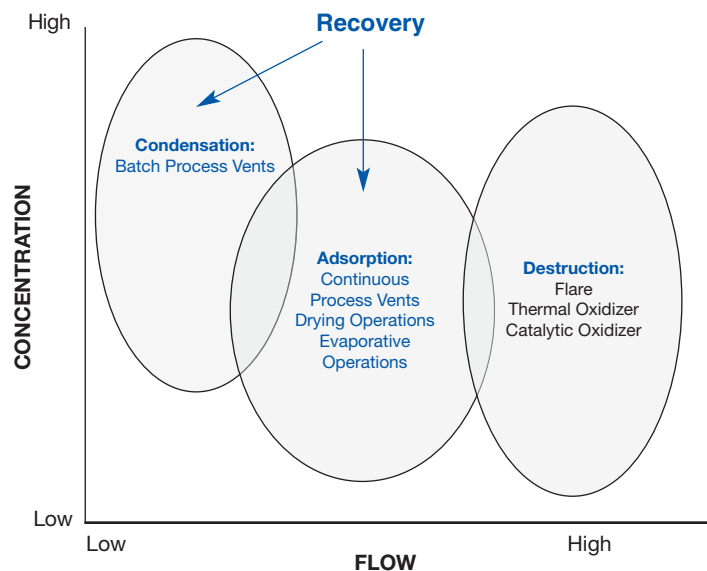
### VOC Recovery Options

Vent gas stream compositions and flow rates vary with each production environment, whether from reactors, storage vessels, dryers or other systems. Praxair offers custom-designed and built systems with the capability to utilize various Smart VOC Recovery technologies.

- **Cryo-condensation**
- **Adsorption with dry regeneration**
- **Internal reflux distillation**

These technologies effectively treat emissions or assist in the recovery of valuable process chemicals whether for batch/discontinuous processes or a continuous operation.

### VOC Control Options



### Cryo-Condensation

#### VOC Rich Streams/Low-Flow Rates

Using liquid nitrogen as the refrigerant, the cryo-condensation process is designed to cool the effluent in a process stream to very low temperatures in proprietary-patented heat exchangers which are characterized by high fractionating capacities of vapors and gases. The stream effluent is separated by decreasing the vapor pressure as a function of the vapor/liquid and vapor/solid equilibrium. The VOC is recovered for reuse in the process or as a fuel, while the nitrogen is cycled back into the process for purging and blanketing operations.

## Adsorption

### *High-Flow Rate*

Using traditional techniques and adsorbents, such as activated carbon, or utilizing new adsorbent materials in conjunction with a step change process design, lean vent gas streams can be concentrated and the VOCs recovered with a reduction of secondary waste streams. The use of a heated nitrogen stream for regeneration eliminates hydrolysis problems and wastewater associated with steam regeneration, and, when operated properly, may safely handle reactive or flammable materials.

## Internal Reflux Distillation

### *Mixed VOC Streams*

Recovering valuable solvents and chemicals from a mixed process stream following cryo-condensation is economically feasible using internal reflux distillation. The flexible design of this technology enables distillation under vacuum, at atmospheric pressure or under pressurized conditions. The system can also handle azeotropic and extractive distillation.

## Efficient and Cost-Effective

In comparison to alternative abatement technologies, the cryo-condensation units are compact requiring a relatively small footprint, and, are skid mounted, lowering installation and start-up costs. The system design minimizes moving parts, reducing maintenance and repair.



## Contact Us

For technologies that provide cost-effective VOC management, call 1-800-PRAXAIR or visit our website [www.praxair.com/VOC](http://www.praxair.com/VOC) for additional information.



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