

Cryo-Condap[®] technology for VOC recovery

AIR
PRODUCTS

herco
KÜHLTECHNIK

Features/benefits

- Proprietary liquid nitrogen cooled condenser: buffering fluid prevents freezing and provides fine-tuned temperature control and flexibility for tightening regulations
- Condensation down to cryogenic temperatures: means recovery above 99% of most VOCs
- Robust in-house modeling software: for modeling molecular interaction and condensation profiles (shown on right)
- Non-destructive recovery: condensate can be recycled, re-sold, burned for energy content or further purified
- Recovery of halogenated compounds: which may not be practical to incinerate
- Recovery of gaseous nitrogen: for inerting and blanketing applications
- Compact design: small footprint, easy to install, scale up and relocate
- Tailored solutions: able to combine liquid nitrogen cooling, mechanical cooling, activated carbon and molecular sieve adsorption and acid scrubbing technologies into a single solution
- Global reach: ISO9001, PED 97/23, EN60079, CSEI and ASME certified equipment

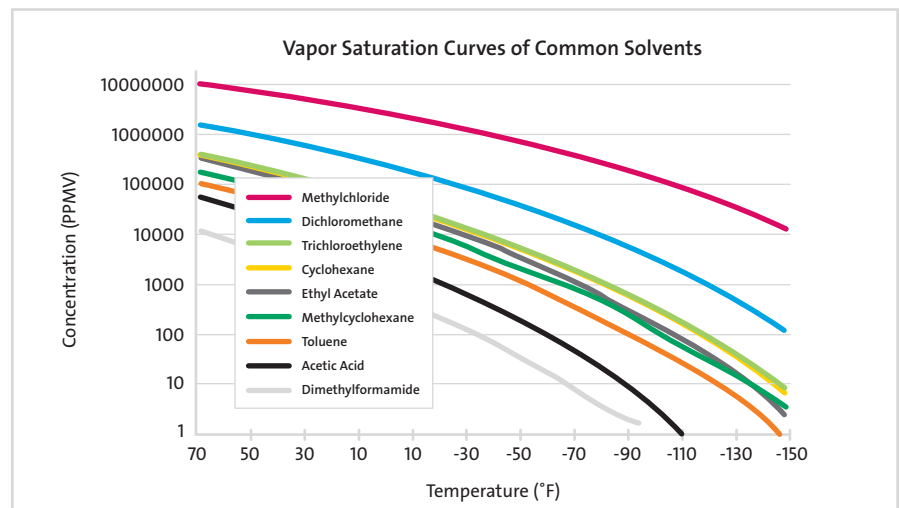


A 150 SCFM (standard cubic foot per minute) Cryo-Condap installation with redundant low temperature condensers.

A leader in cryogenic condensation technology

Teamed with Herco GmbH, Air Products is proud to hold a worldwide leadership position in the engineering of safe, clean, reliable and efficient recovery systems to control the air emissions of:

- **VOCs** (Volatile Organic Compounds) i.e. Methanol, Ethanol, Ethyl Acetate
- **HAPs and TAPs** (Hazardous or Toxic Air Pollutants) i.e. Dichloromethane, Chloroform, Vinyl Acetate
- **ODSs** (Ozone Depleting Substances) i.e. R11, R12, R22



Effect of temperature on the gas concentration of common VOCs at atmospheric pressure.

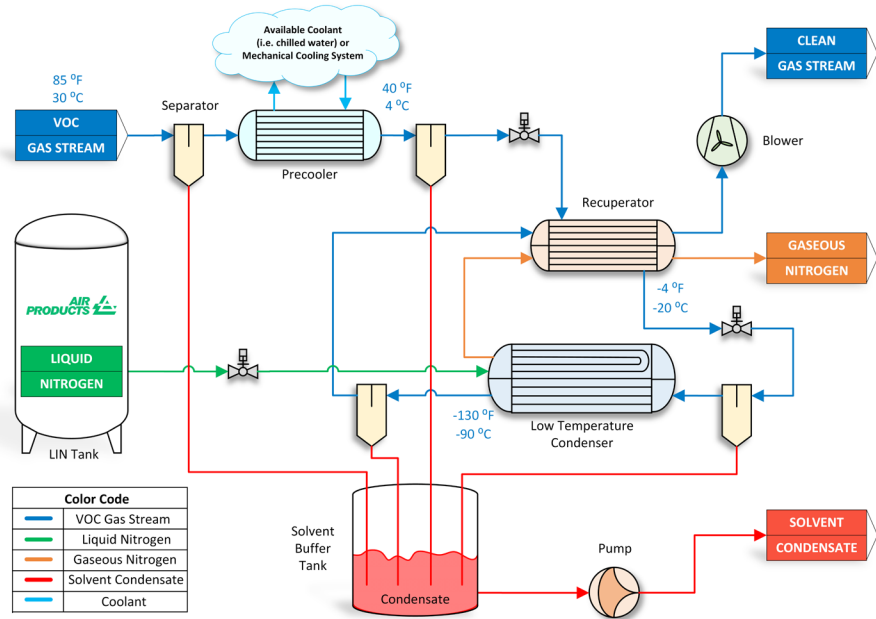
Markets served

- Chemical and Pharmaceutical Manufacturing
- Refrigerant Recycling
- Solvent Recycling Terminals
- Organic Liquids Distribution Terminals
- Coating Lines
- Ethylene Oxide Sterilization
- Petrochemicals
- And many others



40 years of manufacturing experience and over 140 systems successfully installed worldwide.

Basic Cryo-Condap® Process



Overall: The Cryo-Condap® process uses liquid nitrogen in a proprietary low temperature condenser to treat VOC laden emission streams.

Pre-cooling: The VOC gas stream is first pre-cooled with available cooling fluids or a mechanical chiller to condense the bulk of the VOCs and moisture.

Energy recovery: Cold exhaust streams from the low temperature condenser are used to further pre-cool the incoming VOC gas stream.

Cryogenic condensation: The flow rate of liquid nitrogen is regulated to control the temperature of the intermediate heat transfer fluid (HTF) inside the low temperature condenser. The intermediate HTF then cools down the VOC gas stream to the desired temperature to help ensure compliance.

VOC recovery: Condensed VOCs pass through droplet separators and are collected in a buffer tank to be pumped and reused.

Nitrogen recovery: Liquid nitrogen is fully vaporized in the process and exits the system as clean nitrogen gas to be reused for other applications.

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