

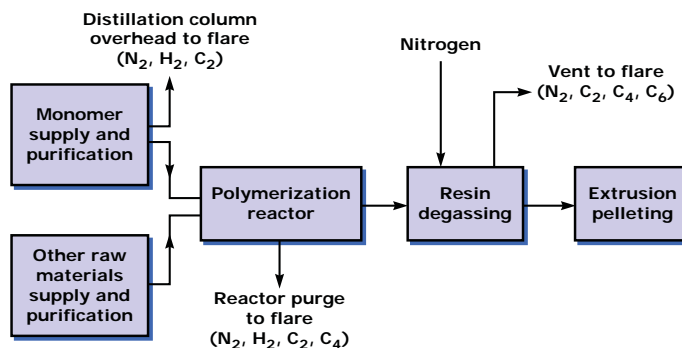


POLYETHYLENE (PE) PRODUCTION

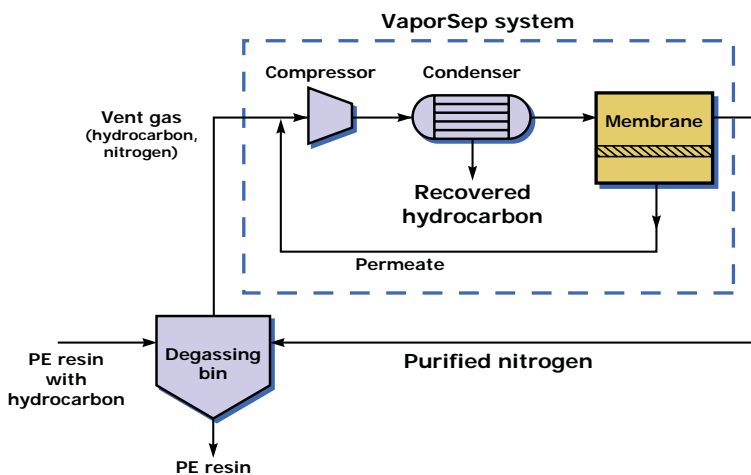
- Recovers valuable ethylene and other hydrocarbons with payback time of 1 year or less
- Minimizes installation cost with skid-mounted construction
- Simplifies operation with few or no moving parts

Problem

During the production of polyethylene (PE), a portion of the ethylene and other hydrocarbon feedstock is lost. The value of the lost feedstock is substantial, ranging from \$1 million to \$3 million per year for a typical PE plant. Losses occur primarily at 3 points in the production process: distillation column overhead vents in the ethylene recovery and purification step, reactor purge vents, and resin degassing vents.



VaporSep® Solution



“By working closely with MTR, we have optimized and integrated their technology into our polyolefin process.”

– US polyolefin producer

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For resin degassing applications, the vent stream is compressed and cooled to condense hydrocarbons. The gas leaving the condenser still contains a significant amount of hydrocarbon. This gas is fed to the membrane units, which separate the stream into a hydrocarbon-enriched permeate stream and a purified nitrogen residue stream. The permeate is recycled to the inlet of the compressor and then to the condenser where the hydrocarbon is recovered. The purified nitrogen stream is recycled to the degassing bin.

For distillation column overhead and reactor purge applications, the VaporSep unit is very simple, consisting of membrane modules only, with no moving parts. The stream leaving the column or reactor is typically contaminated with light gases such as N₂ and H₂. The VaporSep unit splits this stream into a hydrocarbon-enriched stream and a light-gas-enriched stream. The hydrocarbon-enriched stream is returned to the distillation column or reactor where the hydrocarbon is recovered, and the light-gas-enriched stream is vented or flared.

VaporSep units are currently used by major PE producers including ExxonMobil, Formosa Plastics, Sabic, and Sinopec.

Benefits

- **Recovers valuable monomers and other hydrocarbons with typical payback time of less than 1 year**
- **Purifies nitrogen for reuse in the process**
- **Minimizes installation time and expense with skid-mounted construction**
- **Reduces incineration and flare requirements**
- **Achieves significantly higher hydrocarbon recovery than possible by condensation alone**
- **Allows recovery at more moderate temperatures and pressures than condensation alone**
- **Minimizes footprint and weight**
- **Creates no secondary waste streams**

System Description

- **Complete skid-mounted unit includes membrane modules, compressor, heat exchangers, piping, instrumentation, and controls**
- **Unit dimensions: 15 ft (L) x 10 ft (W) x 10 ft (H); 5,000 to 15,000 lb; compressor is mounted on a separate skid of similar size**
- **Conforms to typical petrochemical specifications (ASME, ANSI, PED, TEMA, NEC, or IEC etc.)**
- **Control is by local PLC or through DCS**

System Performance

- **Suitable for vent streams from 300 to 30,000 lb/h, with hydrocarbon concentrations from 10 to 80 vol%**
- **Polyethylene recovery up to 99+%**
- **Nitrogen recovery over 95% with purities of 99+ vol%**

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