Solvent Recovery

by means of distillation

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a better world

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Solvent recovery by distillation

Distillation is the separation of the constituents of a liquid mixture by partial vaporization and subsequent condensation, taking advantage of differences in volatility.

Where high mass transfer rates are required, distillation in general provides an economic and efficient method for the separation of a liquid mixture. It especially applies for applications where high purities shall be achieved or multi-component mixtures are to be separated.

Solution Distillation

Every day, thousands of tons of liquid mixtures of various components accrue in all parts of the world. Distillation solutions are used to separate the liquid components, recycle or produce high-purity products out of waste water or process streams. This is often of benefit to the environment and result in reductions to energy, utility, feedstock and waste disposal costs.
The recovery of solvents and precipitants for their recycling within a process is nowadays most efficiently achieved where the energy requirement is very low, or where energy can effectively be re-used in further applications. Beside this, various variables like the thermodynamic properties of the substances to be recovered, integration into entire production process and requested plant capacity are crucial factors for selection of customized distillation system. GEA provides different arrangements with Mechanical Vapour Recompression (MVR) or multi-effect heat integrated products.

Recovery of Isopropanol

The usage of alcohols, especially isopropanol, as a precipitation medium for the production of biopolymers like pectin, carrageenan or xanthan is a wide spread technology to separate such polymers from water, biomass or other impurities still contained in their intermediate production states. After precipitation and following mechanical separation the isopropanol has to be recovered from the water containing effluent stream.
For this field of application, where a large difference between the boiling temperature at the bottom of the column and condensation temperature of the top vapors appear, GEA provides a unique, patented distillation solution of saving energy. A split-column design will be used for efficient heating of rectification and stripping section each by means of Mechanical Vapor Recompression (MVR). This design allows energy savings of around 50% compared to an MVR-heated one-column system. During normal operation, no additional heating steam is required.

Multi-effect evaporation and solvent rectification system in a pectin extraction plant

Distillation plant with mechanical vapor recompression for the recovery of solvents from the production of biopolymers

Ethanol Separation

Since more than 100 years GEA supply various kinds of separation units for one of the most utilized organic solvent ethanol. Depending on different requirements like operating capacity, feed properties, utilities, GEA provides distillation products from small batch system, via continuous operating columns up to energy coupled multi-effective distilleries.

To engineer and design our plants we use most modern simulation tools supported by our laboratory and based on variable distillation-test units. Beside separation, GEA can offer additional purification and dehydration units for further treatment of ethanol. Moreover, individual interconnection with other technical units of complex processing plants is one of our unique design characteristics. For example separated ethanol vapors are used for subsequent evaporative concentration of effluent streams.

A wide variety of ethanol separation plants have been put into operation throughout the world up to now. Various configurations with capacity ranging from 100 to 100,000 tons per year have been installed.

Engineering Portfolio and Applications

Continuous advancement is the key in efficient process engineering technologies, tailored to the product properties. Therefore our experienced engineering team is supported by our process technology- and R&D-center using most modern simulation tools and variable distillation-test units.

Engineering portfolio for various distillation Jobs:

- Pre-Engineering / FEED (Front-End Engineering Design)
- Basic Engineering
- Detail Engineering
- Engineering for taylor made applications, studies, consultancy

Key equipment for distillation plants:

- Columns with various internals
- Heat exchangers like reboilers and condensers
- Pumps and other machines or special vessels
- Automation equipment like field instruments, cabinets or PLC

Package units and systems or complete process lines:

- Supplementing key equipment deliveries to package units and systems, complete process lines with piping, insulation, automation etc.
- Integration of other process units from GEA or sub-suppliers (evaporator, dryer, crystallizer, filtration unit, decanter...)
- Supervision of assembly and commissioning or execution under defined conditions.

Chemical applications

Specialty and fine chemicals and solvents:

- Alcohol/solvent-dehydration with molecular-sieve units, entrainer-distillation/alcohol-dehydration with cyclohexane, MEG
- Purification of NMP, DMAc, GBL from wet spinning processes from fiber and hollow fiber production
- Purification and recovery of typical alcohols: Methanol, ethanol, n/i-propanol, n/i-butanol, pentanols, 2-ethyl-hexanol, glycol, DEG,
- Purification/recovery of typical esters, ethers, ketones, alkanes/aliphatics, aromatics, chlorinated solvents, bio- and other solvents

White Biotech:

- Polyol-separation (PDO/BDO from fermentation broth), organic acid recycling in lignocellulose-hydrolysis

Green Biotech/Energies/Environment:

- Bioethanol as fuel additive/substitute for ETBE; mash preparation, hydrolysis & fermentation, distilleries, glycerol/methanol separation for biodiesel, ethanol from waste water in pulp&paper production, advanced biofuels, HTF-recovery (Dowtherm™) for solar power plants, BTEX-removal from waste water

GEA Service - for your continued success

Working with GEA Service means partnering with a dedicated team of service experts. Our focus is to build, maintain, and improve customer performance throughout the entire life cycle of the plant and its equipment.

- Beginning of Life Services - Getting you started with seamless support for instant productivity and performance
- Lifetime Services - Keeping it running with the cost-efficient way of ensuring safety and reliability
- Extended Life Services - Constantly improving by sharing our knowledge to safeguard your investment
- Consulting & Enhanced Operations - Together with you by enduring commitment to you and your business

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