Vacuum Distillation system

Distillation is the process of separating volatile from non-volatile components present in a mixture. The general process consists of evaporating the mixture passing it through separation column and condensing the vapors back into a liquid. Parsian Green Chemical Industries Co. solvent distillation units separate volatile solvents from non-volatile materials and higher boiling solvents that have contaminated the solvent during some type of manufacturing process. The waste solvent temperature is raised to boiling point, vapors are separated in a column separator and collected after condensed. Knowing that many solvents are heat sensitive e.g. styrene monomer or have high boiling points, vacuum distillation may be needed.

Advantages

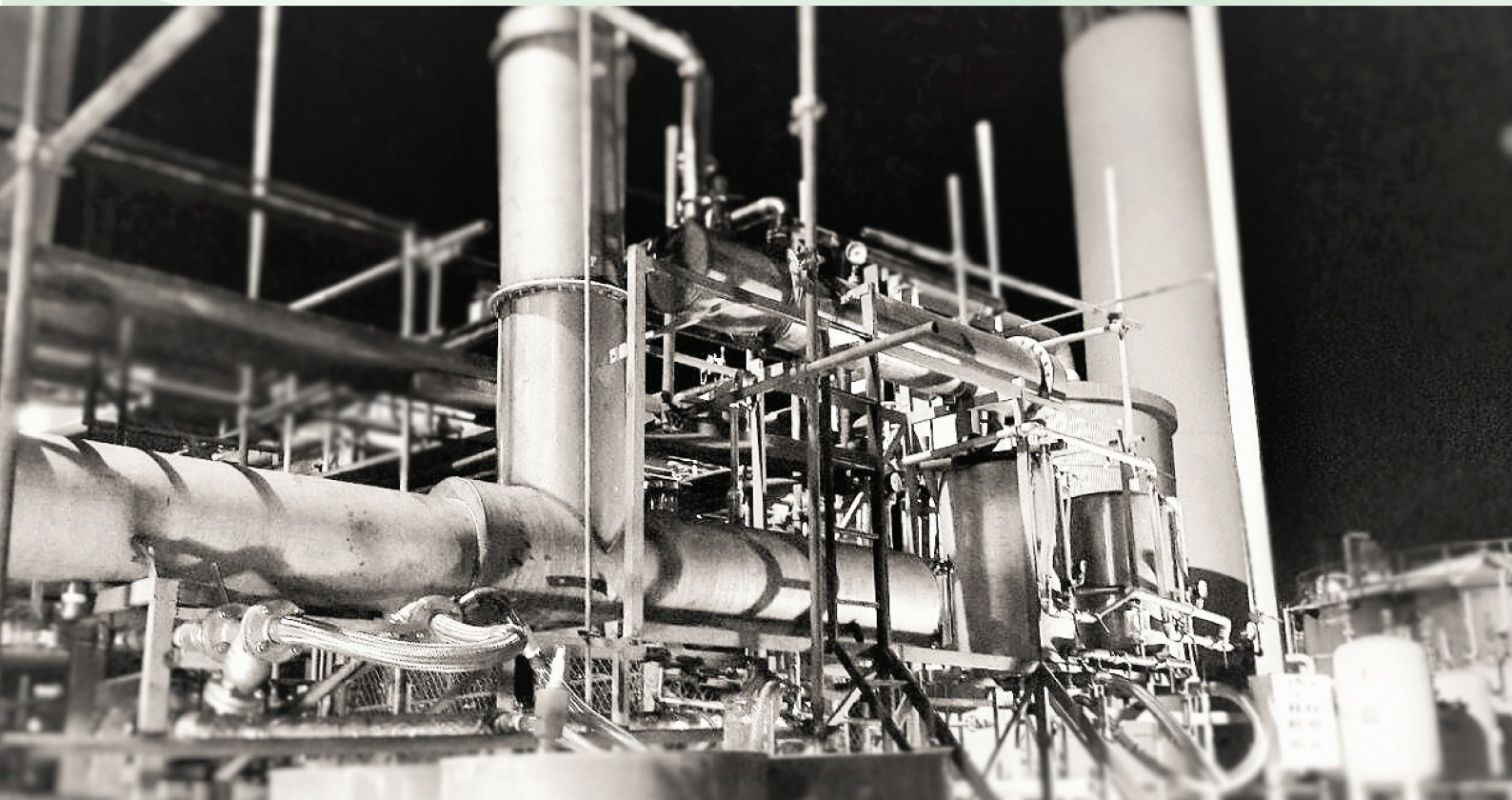
- Ability to recover different solvents in short batches during working day
- High separation rate
- Low amounts of waste
- Ability to recover heat sensitive and high boiling materials

Equipment

- Batch, semi-batch and continuous atmospheric and vacuum distillation
- Explosion proof pumping equipment
- Automatic temperature, pressure and flow control
- Forced circulation stainless steel single and double pass heat exchanragers
- Skid mounted equipment with lifters and appropriate guarding rails
- Various types of sieve and packing fractional column
- High density stainless steel fabric woven packing

Applications

- acetone and styrene from fiberglass residue
- methanol and acetone from parts washing
- mineral spirits from paint and resin tank washing
- recovery of pharmaceutical waste
- paint thinner from paint and resin



Design and construction of solvent recovery unit in **Karoon petrochemical**

SSSPE Co. شرکت شیمیایی سبز پارسیان
Parsian Green Chemicals

Pervaporation technology

Pervaporation is derived from the two processes of permeation of water or an organic through a membrane and then evaporation to the vapor phase.
Pervaporation is used in many industries, such as chemical and food processing. The most important part of Pervaporation is the membrane. Membranes select one of the phases and passes it through. This means one the other phase would be richer over time. Although the other phase does pass through the membranes also but the transport rate for this phase would be lower. This transport rate would define the term of "selectivity" of the membrane which is a very important factor in membrane manufacture and design.
Parsian Green Chemical Industries Co. is the sole provider of Pervaporation systems in Iran reaching remarkable results in membrane manufacture and module design. We have been constructing dehydration units with over five successful pervaporation units and one distillation-pervaporation unit for IPA recovery.

Equipment;

Stainless steel housing
- Equipped with liquid nitrogen or dry ice cold trap
- Explosion proof circulation pump
- Automatic water content analysis
- Automatic pressure release
- Automatic temperature and separation control
- Equipped with heating coils and jackets to maintain temperature and cooldown within single batch

Stainless steel module
containing 45 to 1000 tubular membranes
- High pressure sealing
- Viton and PTFE sealing material
- 8 bar of working pressure and 150 degrees of temperature

Membranes
- ۳A and ۴A zeolite membranes
- Composite polymer-ceramic membranes
- Optimized silica membranes
- PDMS solvent reduction membranes
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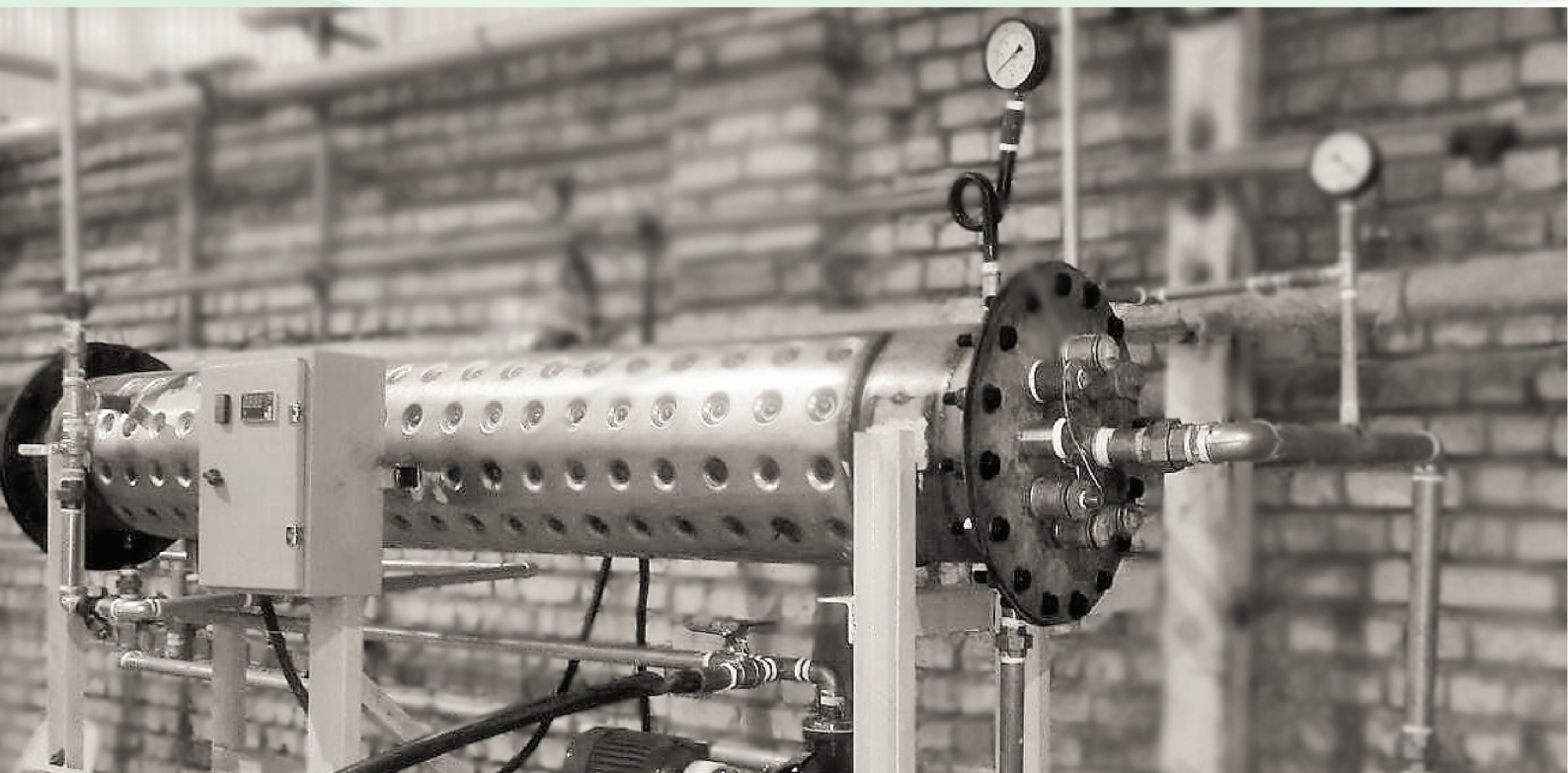
Applications;

- Dehydration of Organic solvents
- Fuel grade ethanol production
- Removal of organics from aqueous solutions
- Separation of organics from each other
- Coupling with distillation for enhance separation and lower energy consumption
- Methanol removal from methyl acetate and MTBE
- Constant water removal form esterification reactors



Construction of the first industrial solvent dehydration plant with zeolit membranes

Wiped and thin film evaporation

Thin Film Evaporation refers to thermal separation of solvents and residue in a mechanically spread thin layer with high turbulent liquid characteristics. The waste solvent enters the system and is spread on the periphery by a distribution ring and then picked up by rotor blades whilst falling in the vessel by gravity. The surface which the film is spread is heated with a mantle up to ۴۰۰ degrees. High temperature difference, low pressures, short traveling distance of product vapor and the mechanically induced spreading that causes highly agitated layers with very high heat transfer rates, make Thin Film Evaporation superior in many processes with heat sensitive and viscous materials as well as high boiling point materials like oils and paraffin. Thin Film Evaporation can be used in many processes such as distillation,evaporation, concentration, degassing, de-odourisation and reaction-distillation.

Advantages

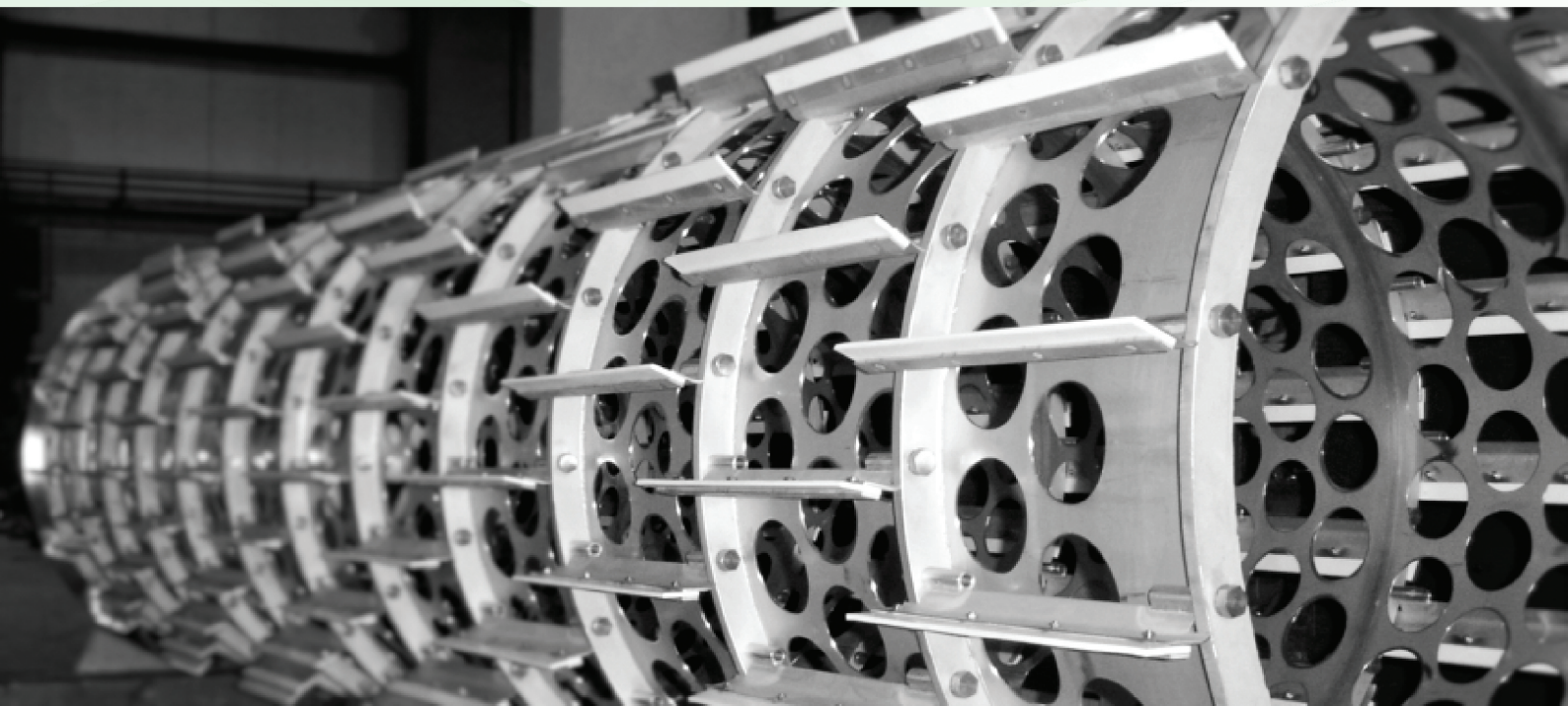
- Ability to evaporate high boiling and heat sensitive chemicals
- Lower energy consumption relative to kettle type evaporators
- Easy cleaning and maintenance
- Ability to evaporate solvent mixtures with viscosities up to 50,000 cp

Equipment

- Stainless steel wiper blades in various forms and angles
- Stainless steel close clearance blades in various forms and angles
- Stainless steel housing
- Explosion proof rotor
- High pressure steam and oil heating jacket

Applications

- Recovery of waste solvents up to 99% of solvent mass
- Evaporation of monomer from monomer-polymer matrix
- Usage as boiler in fractional distillation systems
- Recovery of waste cooking and base oil
- Recovery of heat sensitive material e.g. monomers



Agitated wiped film evaporators blade with 10 ton/hr capacity

Pressure Swing Adsorption

PSA or Pressure Swing Adsorption is the process of separating liquid or gas parts from a mixture by adsorption and by the tendency of each molecule to adsorb in a different rate to an absorber. In this process after saturation of the absorber the adsorption bed is regenerated. The regeneration process is carried out by putting the bed under vacuum and an inert gas purge like nitrogen or carbon dioxide. The regenerated bed is then again used as an adsorption bed and the bed being under process is now shifted to regeneration mode.

Advantages

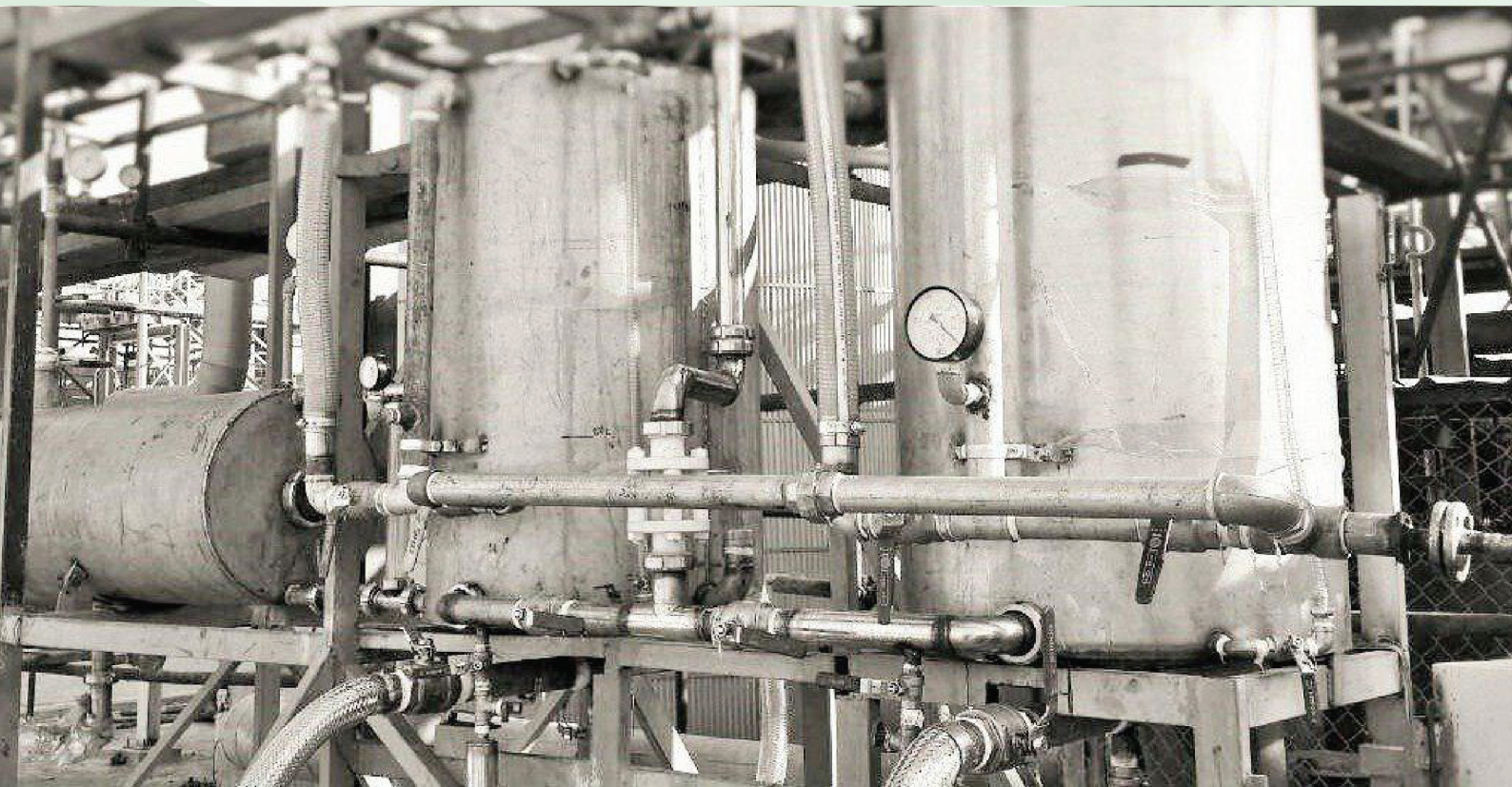
- Lower energy consumption in comparison with fractional distillation
- Ability to dehydrate solvents in liquid form and low pressure
- Ability to separate chemicals by their molecular size

Equipment

- Molecular sieve with pore size 3 to 13 Angstrom
- Stainless steel packing bed and column
- Automatic temperature, pressure swing and flow control with ex standard equipment
- Vacuum regeneration system with nitrogen, argon and CO_2 purge gas
- High performance stainless steel evaporator, super heater and condenser

Applications

- Dehydration of polar solvents such as methanol, ethanol and Isopropyl alcohol
- Dehydration of aromatic solvent mixtures
- Dehydration of solvent mixtures such as methyl acetate-methanol
- Separation of methanol from methyl acetate and MTBE
- Air dehydration
- Production of industrial and pharmaceutical gas



Pressure swing adsorption system