Solvent Deasphalting

- In this extraction process, which uses propane (or hexane) as a solvent, heavy oil fractions are separated to produce heavy lubricating oil, catalytic cracking feedstock, and asphalt.
- Feedstock and liquid propane are pumped to an extraction tower at precisely controlled mixtures, temperatures (150°-250° F), and pressures of 350-600 psi.
- Separation occurs in a rotating disc contactor, based on differences in solubility.
- The products are then evaporated and steam stripped to recover the propane, which is recycled.
- Deasphalting also removes some sulfur and nitrogen compounds, metals, carbon residues, and paraffins from the feedstock.

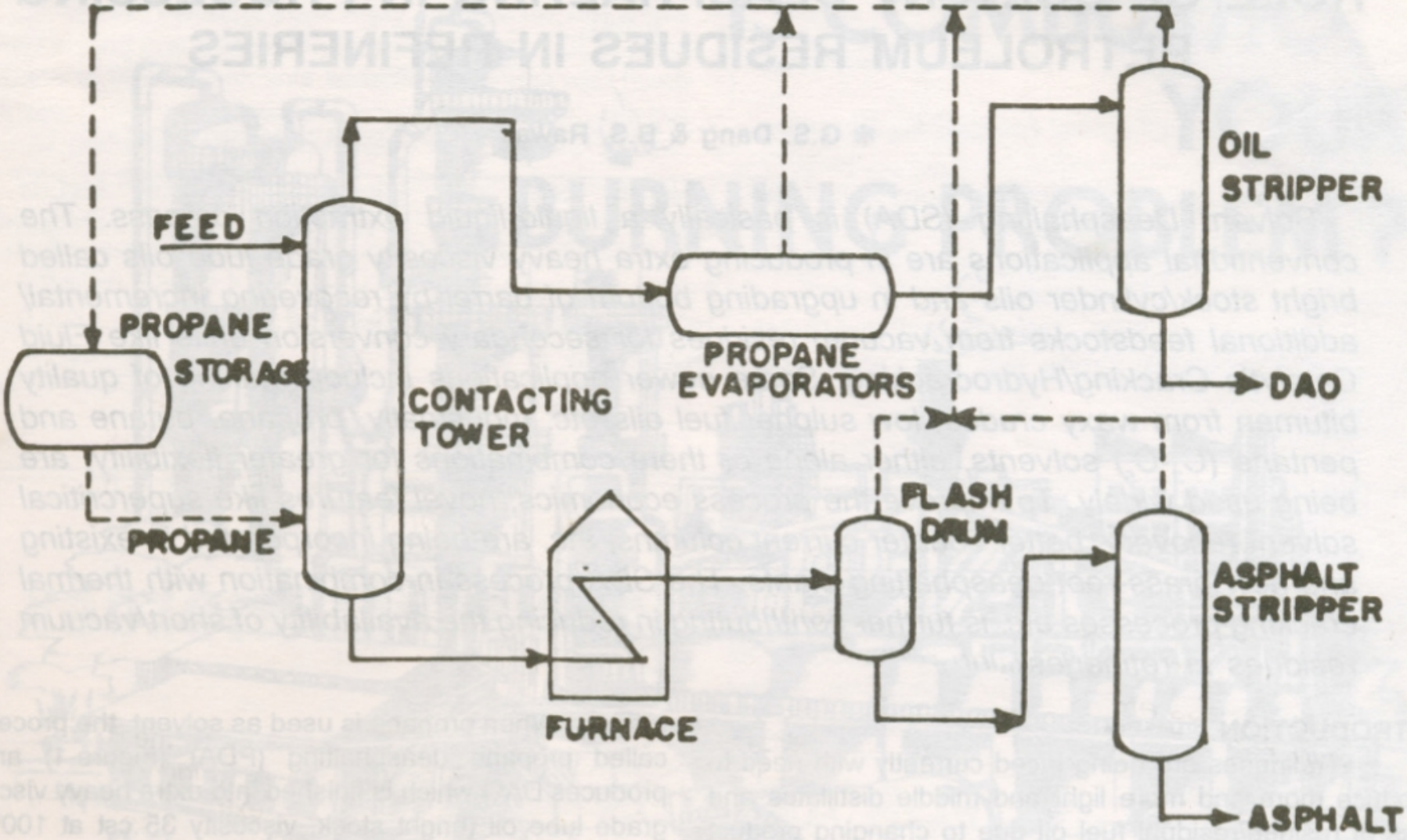


FIG. 1 - PROPANE DEASPHALTING

Solvent Deasphalting

Feedstock	From	Process	Typical products . . To
Residual, reduced crude	Atmospheric tower & Vacuum tower	Treatment	Heavy lube oil . . . Treating or lube blending Asphalt . . . . . Storage of shipping Deasphalted oil . . Hydrotreat & catalytic cracker Propane . . . . . Recycle

Solvent Dewaxing

- Solvent dewaxing is used to remove wax from either distillate or residual basestocks at any stage in the refining process.
- There are several processes in use for solvent dewaxing, but all have the same general steps, which are:
  - (1) mixing the feedstock with a solvent,
  - (2) precipitating the wax from the mixture by chilling, and
  - (3) recovering the solvent from the wax and dewaxed oil for recycling by distillation and steam stripping.
- Usually two solvents are used: toluene, which dissolves the oil and maintains fluidity at low temperatures, and methyl ethyl ketone (MEK), which dissolves little wax at low temperatures and acts as a wax precipitating agent.

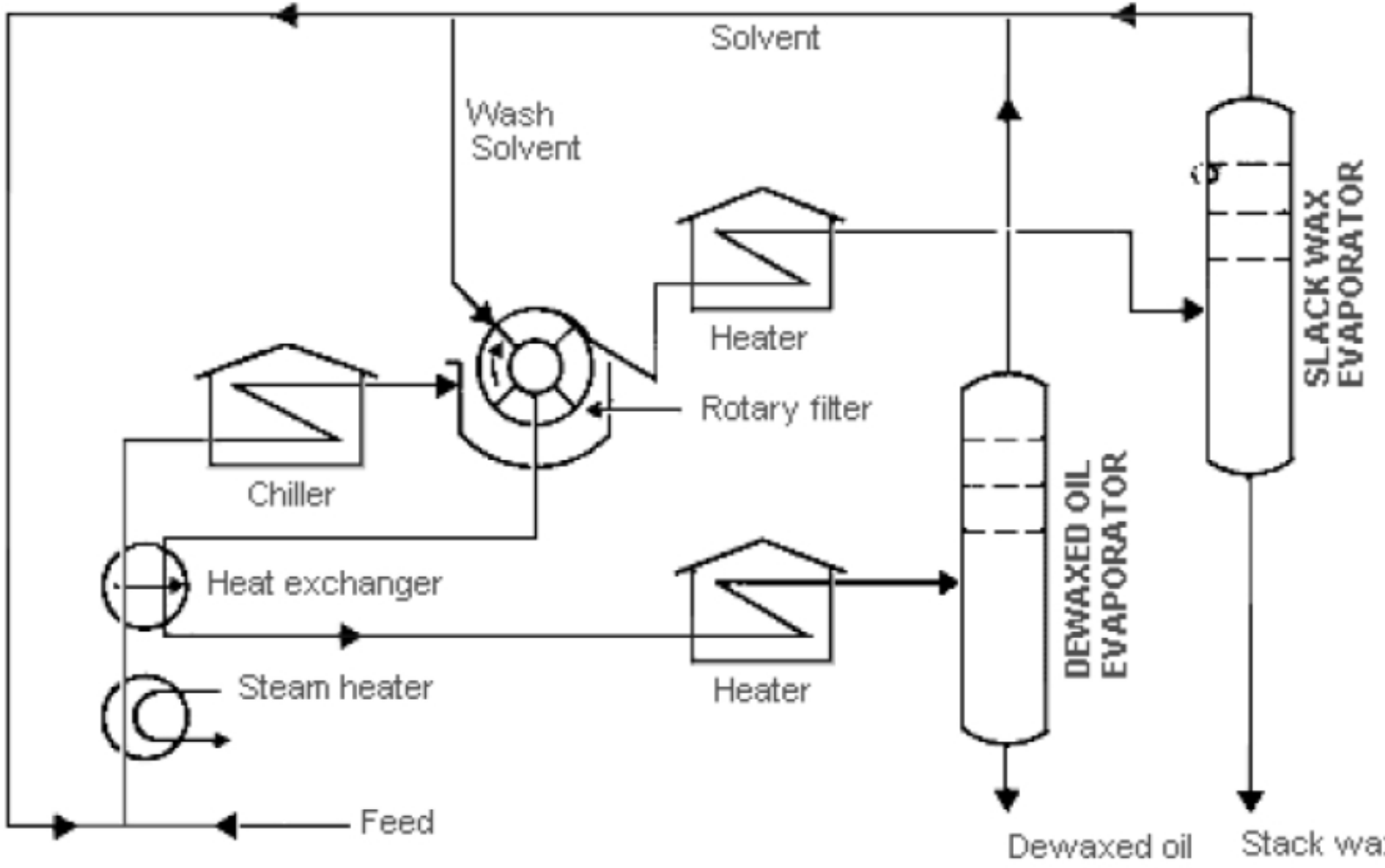
Solvent Dewaxing

Process Control & Safety

- Other solvents that are sometimes used include benzene, methyl isobutyl ketone, propane, petroleum naphtha, ethylene dichloride, methylene chloride, and sulfur dioxide.
- In addition, there is a catalytic process used as an alternate to solvent dewaxing.

Feedstock	From	Process	Typical products . . To
Lube basestock	Vacuum tower	Treating	Dewaxed lubes . . . . . Hydrotreating Wax . . . . . Hydrotreating Spent agents . . . . . Treatment or recycle

Solvent Dewaxing



Solvent Extraction

- The purpose of solvent extraction is to prevent corrosion, protect catalyst in subsequent processes, and improve finished products by removing unsaturated, aromatic hydrocarbons from lubricant and grease stocks.
- The solvent extraction process separates aromatics, naphthenes, and impurities from the product stream by dissolving or precipitation.
- The feedstock is first dried and then treated using a continuous countercurrent solvent treatment operation.
- In one type of process, the feedstock is washed with a liquid in which the substances to be removed are more soluble than in the desired resultant product.
- In another process, selected solvents are added to cause impurities to precipitate out of the product.

Solvent Extraction

Process Control & Safety

- In the adsorption process, highly porous solid materials collect liquid molecules on their surfaces.
- The solvent is separated from the product stream by heating, evaporation, or fractionation, and residual trace amounts are subsequently removed from the raffinate by steam stripping or vacuum flashing.
- Electric precipitation may be used for separation of inorganic compounds.
- The solvent is then regenerated to be used again in the process.
- The most widely used extraction solvents are phenol, furfural, and cresylic acid.

Solvent Extraction

- Other solvents less frequently used are liquid sulfur dioxide, nitrobenzene, and 2,2'-dichloroethyl ether.
- The selection of specific processes and chemical agents depends on the nature of the feedstock being treated, the contaminants present, and the finished product requirements.

Solvent Extraction

Process Control & Safety

Feedstock	From	Process	Typical products . . . To
Naphthas, distillates, kerosene	Atm. tower	Treating/ blending	High octane gasoline . . Storage Refined fuels . . . . . Treating and blending Spent agents . . . . . Treatment and blending

Solvent Extraction