

SOLVENT EXTRACTION

Solvent Extraction is an efficient, environmentally friendly technology for the production of premium products in lubricant refineries and for the petrochemistry.

By means of extraction using suitable solvents high-quality lubricants and special process oils (TDAE/ TRAE, MES etc.) are obtained from vacuum distillates and deasphalted oil (DAO). And what is more, the solvent extraction is an attractive and cost-efficient alternative for the production of white spirit compared to the hydrogenation process.

TECHNICAL FEATURES

As a first step of extraction the aromatic compounds are removed from the feedstock. In further process stages (dewaxing/deoiling and hydrogenation) the resulting product (raffinate) is processed to base oils.

The byproducts (high aromatics extracts) obtained can be refined in a second extraction stage in the solvent extraction unit as high-quality specialties, for example PCA-free process oils such as Treated Distilled Extracts (TDAE) and Treated Residue Extracts (TRAE). Said products can be used as tender oils in the tire industry (Fig. 1) and for other purposes.

At our own pilot plants and in cooperation with Sulzer Chemtech (Allschwil, Switzerland) the necessary process parameters and the optimal process conditions are determined based on the customer, process and product requirements (Fig. 2).

Different solvents, such as NMP, furfural, DMSO and special solvent mixtures with co-solvents, are scrutinized and compared. Such investigations are the basis for providing the customer with the optimal solution for the qualities required.

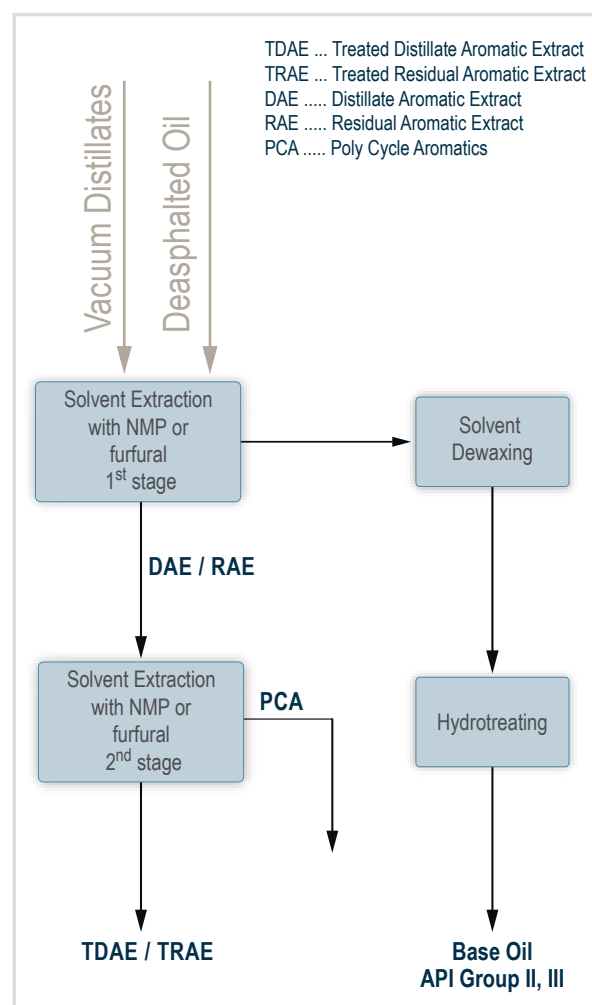


Fig. 1: Process chain

EXTRACTION
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The following main results are obtained from the tests:

- Determination of equilibrium data
- Optimization and determination of process parameters
- Optimization of solvent ratio to feedstock
- Analytical evaluation of product qualities, such as PCA
- Determination of yields
- Determination of flooding point by hydraulic column tests using original internals on a pilot scale.



Fig. 2: Pilot plant at EDL in Leipzig (left) and at Sulzer in Allschwil (right)

FEEDSTOCK

- Aromatic extracts (DAE / RAE)
- Deasphalted oil (DAO)
- Vacuum distillates
- Used oil

PRODUCTS

- Raffinates for base oil production
- Special process oils such as TDAE und TRAE
- White spirit

ECONOMIC EFFICIENCY

To increase efficiency and achieve an optimal product quality, advanced column internals are used. When using agitated column internals (Fig. 3) the capacity can be up to 50 % higher with the product quality being the same.

BENEFITS FOR CUSTOMERS

EDL and Sulzer offer a comprehensive program for the evaluation of test and analytical data both for the thermodynamic and hydraulic design of the extraction column, including the entire process of the solvent extraction.

Thanks to the technological cooperation the expertise gained from the production of state-of-the-art extractor internals and years of plant engineering are combined with advanced package process solutions.

REFERENCES

Over 25 agitated extraction columns of which some having a diameter of more than 2.7 m are being operated worldwide for aromatic compound extraction.



Fig. 3: Extraction column with agitated internals by Sulzer (left), highly efficient agitated column internals by Sulzer (right)

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