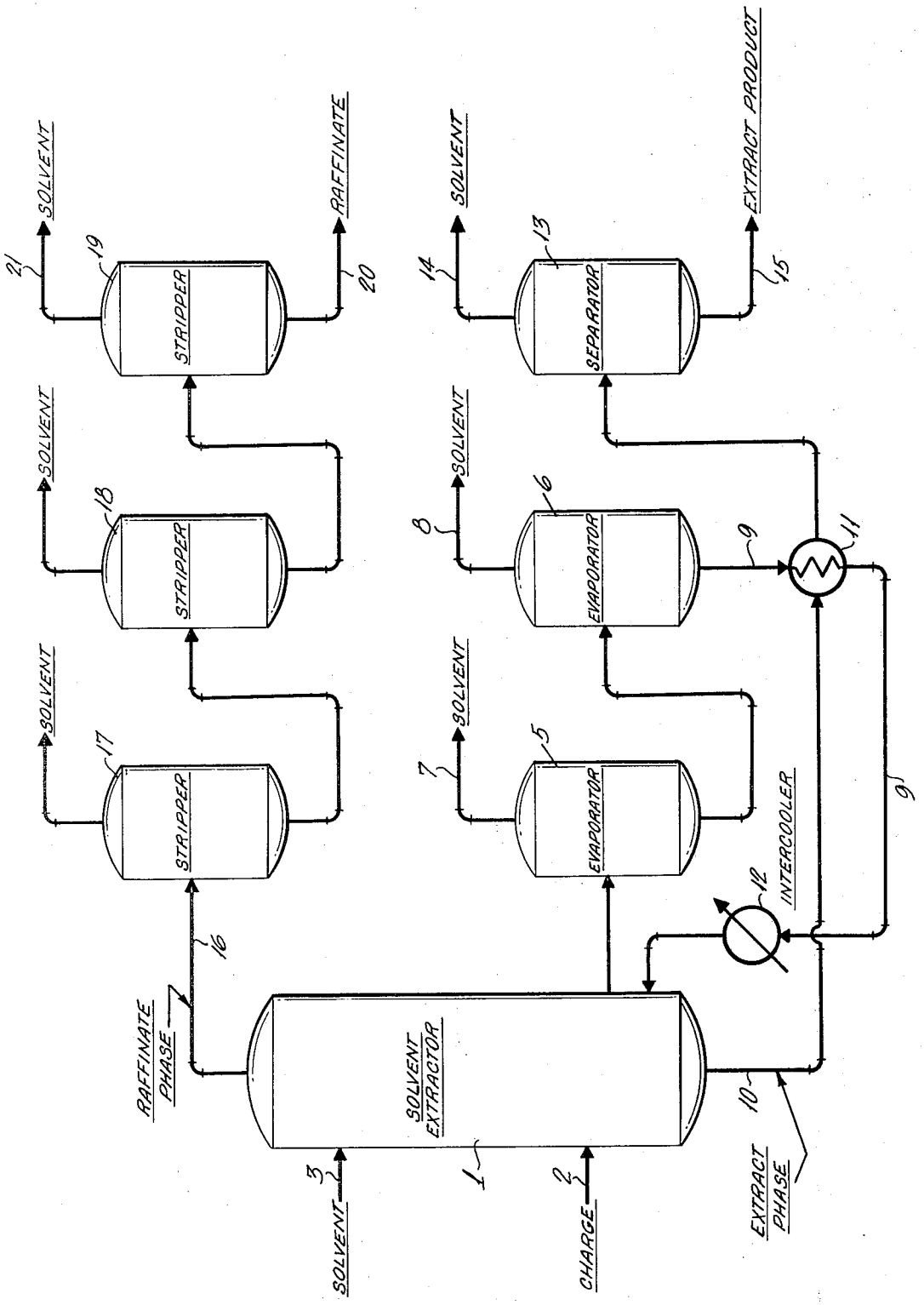
July 23, 1974 IB STEINMETZ ET AL 3,825,489

EXTRACTION PROCESS

Filed Nov. 21, 1972



United States Patent Office 3,825,489 Patented July 23, 1974

3,825,489

EXTRACTION PROCESS

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Filed Nov. 21, 1972, Ser. No. 308,377
Int. Cl. C10g 21/16
U.S. Cl. 208—327 2 Claims

ABSTRACT OF THE DISCLOSURE

A solvent extraction process, more particularly a furfural extraction process wherein a portion of the extract phase is withdrawn from the extraction zone, concentrated and cooled by evaporation of part of the solvent contained therein and by cooling means and returned to the extraction vessel, thereby enhancing the aromatic-paraffinic separation taking place therein.

BACKGROUND OF THE INVENTION

1. Field of the invention

This invention relates to a process for effecting solvent extraction of hydrocarbon oils containing aromatic components to prepare an aromatic concentrate. More particularly this invention relates to said extraction using furfural.

2. Description of the prior art

Extraction of aromatic components from hydrocarbon oils with furfural or other solvents is well known. The extraction is usually conducted at temperatures wherein both the raffinate and extract are in a fluid, easily handled liquid phase. The aromatic hydrocarbons are dissolved by the solvent and separated from the mixtures as the rich extract phase from which the aromatics are further separated by distillation and, in a commercial process, the solvent is recirculated to the extractor. The paraffinic and naphthenic hydrocarbons from the raffinate phase which also contain small quantities of the solvent are also generally processed by distillation in a commercial process with the solvent being recirculated to the extractor.

One problem which arises in furfural extraction of lube stocks to produce lubricating oils and extract oil is reaching an acceptable aromatics content and a low wax content in the extract while producing high viscosity index lubes in the raffinate stream.

SUMMARY OF THE INVENTION

We have now discovered a process whereby the aromatic content in the extract product is substantially increased which comprises:

(a) solvent extracting of a hydrocarbon feed in an extraction zone,
(b) withdrawing a portion of the extract phase from said extraction zone,
(c) evaporating a portion of the solvent contained in said extract phase in a separation zone and removing said evaporated solvent from the process,
(d) recycling the remaining portion of said extract phase, now rich in extract product, through a cooling zone, and
(e) returning said cooled, concentrated extract phase to the extraction zone thereby enhancing the separation taking place therein.

DESCRIPTION OF THE DRAWING AND THE PREFERRED EMBODIMENT

A more complete understanding of the invention may be had from a consideration of the accompanying drawing which is a schematic flowsheet of the preferred embodiment of the invention.

A hydrocarbon oil feed containing aromatic and paraffinic components to be separated from each other, enters the solvent extractor **1**, via line **2**. A suitable solvent, normally an organic liquid which preferentially dissolves aromatic hydrocarbons from hydrocarbon mixtures containing same in admixture with paraffinic or naphthenic hydrocarbons, enters said extractor via line **3**. The preferred solvent is furfural but other organic compounds meeting the above criterion may also be employed, e.g. phenol.

A portion of the solvent and aromatic compounds which comprise the extract phase is withdrawn from the extractor via line **4** usually containing 80–95% solvent and enters a series of separation zones **5** and **6**. In each zone, solvent is separated by an evaporation mechanism, withdrawn overhead via lines **7** and **8** and sent to a solvent storage or make-up tank, not shown. The solvent thus separated is then handled similarly to other solvent streams in the solvent recovery system, and reused in the extraction. The bottom stream from said series of separation zones, which can also be one larger separation zone passes through heat exchanger **11** countercurrent to extract bottoms withdrawn from extractor **1** via line **10**. The concentrated extract continues via line **9** through cooling means **12** and is recycled to extractor **1**. The usual solvent content of the stream now in line **9** is 10 to 20 percent. The cooler more concentrated extract changes the equilibrium in the extractor zone resulting in a more concentrated extract phase being withdrawn via line **10** and being sent through cooler **11** and to product solvent separator **13**. Here, the remaining solvent is removed, via line **14** usually with steam, and the final extract product is withdrawn via line **15**.

The raffinate phase withdrawn from extractor **1** via line **16** passes through a series of separation zones **17**, **18** and **19** and is separated from the solvent usually with steam. Improving the purity of the extract product by the inventive process also results in improved purity of the raffinate which is withdrawn via line **20**. The remaining solvent is withdrawn via line **21**. It should be noted that the series of separation zones **17**, **18** and **19** shown can also be one larger separation zone.

Example 1

As shown in Table 1A, an extract product (Lagomedio) from a conventional extraction process run at 220° F. having 84 wt. percent aromatic contained therein was subjected to additional solvent treatment at varied temperatures to show the increase in aromatic content which can be achieved by the process of the present disclosure. In the following runs, the temperature is decreased as would result from outside cooling of an extract recycle.

TABLE 1A

Run number	Temperature ° F.	Solvent dosage vol. percent charge	Aromatics wt. percent in extract product	Change in aromatic wt. percent over charge
1	170	150	70	+6
2	160	150	91	+7
3	150	150	92	+8
4	140	150	93	+9

Example 2

As shown in Table 1B, a second extract product (Mid-Continent) from a conventional extraction process having 69 wt. percent) aromatics contained therein was treated as in Example 1 except that the solvent dosage was varied as well as the temperature.

TABLE 1B

Run number	Temperature, ° F.	Solvent dosage, vol. percent charge	Aromatics wt. percent in extract product	Change in aromatic, wt. percent over charge
5	160	90	74	+5
6	160	75	77	+8
7	140	90	77	+8
8	140	75	79	+10

Table 1A shows the step-wise increase in aromatics content of the extract as the temperature is lowered in increments of 10° F. from Run 1 to Run 4 at constant solvent dosage. Table IB shows the effect of decreasing temperature at two different solvent dosage levels. Runs 5 and 7 are at 90/vol. percent and Runs 6 and 8 are at 75 vol. percent. In both sets, an increase in aromatics wt. percent is seen as the temperature is decreased.

Desired product specifications can be met by variation of solvent dosage and chill temperature by one reasonably skilled in the art utilizing the inventive teaching disclosed herein.

We claim:

1. In a process comprising contacting, in an extraction zone, a hydrocarbon mixture, which contains aromatic and paraffinic compounds, with a solvent which preferentially dissolves said aromatic compounds and separating said hydrocarbon mixture into a first aromatic extract and a paraffinic raffinate, the improvement which comprises:

(a) withdrawing a second aromatic extract stream from said extraction zone,

(b) evaporating part of the solvent from said second aromatic extract stream in an evaporation zone,

(c) withdrawing solvent stream from said evaporation zone,

(d) withdrawing a cooler more concentrated second aromatic extract stream from said evaporation zone,

(e) cooling the concentrated aromatic extract stream in a cooling zone and recycling said cooler more concentrated second aromatic extract stream to said extraction zone.

2. The process of Claim **1** wherein the solvent used is furfural.

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U.S. Cl. X.R.

208—318, 319, 320, 321; 260—674 S.E.