

SOLVENT EXTRACTION OF LUBE OIL FRACTION

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Solvent extraction is the most widely used method of removing aromatics & other undesirable constituents from lube oil fractions. The removal of these components improves viscosity index, oxidation stability & inhibition response of lube oil base stocks.

The following characteristics are to be considered in the solvent for use in commercial solvent extraction process.

- High selectivity for undesirable component
- Good solvent power to keep low solvent to feed ratio
- High extraction temperature
- Easy to recover from extract & raffinate streams by simple flash distillation
- Low vapour pressure
- High density
- Show emulsification
- Stable
- Adaptable to a wide range of feedstocks

- Available at reasonable cost
- Non corrosive
- Non toxic

The most common solvent in extraction process are
FURFURAL, PHENOL, N-METHYL-2-
PYRROLIDONE.

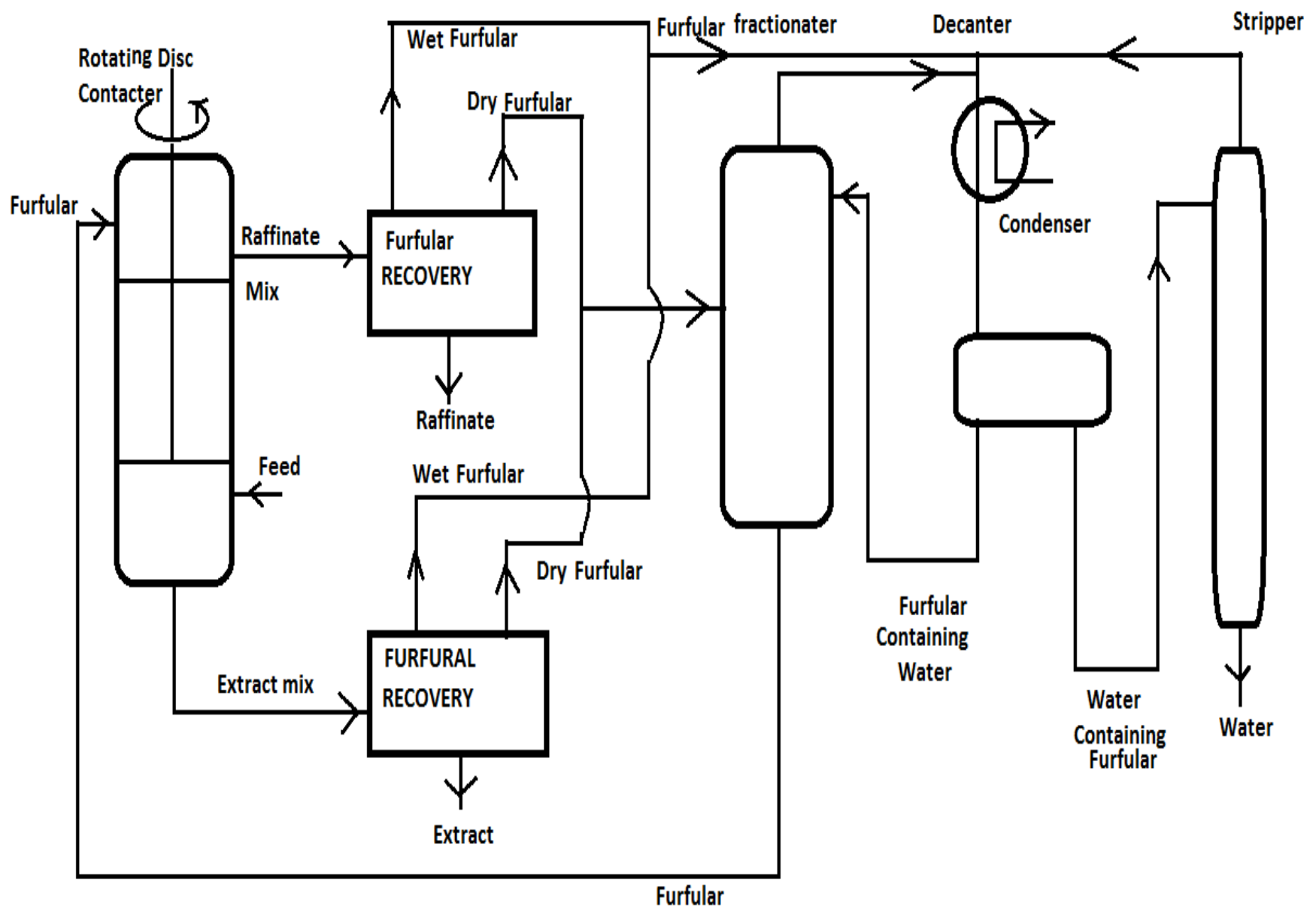
Comparison of Furfural, NMP, and Phenol

- The molecular structure and some of the properties of furfural, NMP and Phenol are compared below.

	Furfural	NMP	phenol
Cost	intermediate	high	low
Boiling point	161.7	201.7	181.7
Selectivity	excellent	Very good	good
Solvent power	good	excellent	Very good
Stability	good	excellent	Very good
Toxicity	moderate	low	high
Biodegradability	good	good	good

Process Description

- The charge oil is either cooled or heated to the extraction temp & fed to the bottom section of extraction column, a rotating disc contactor(RDC)
- Furfural from the furfural accumulator is fed to the upper section of RDC.
- The intermediate extract from the bottom of RDC is cooled and routed to the outside settler, where it separates into two phases.



Furfural Extraction Process

- From the bottom layer it is send to the extract recovery section.
- The upper layer is the “pseudo-raffinate” phase.
- The raffinate phase leaves the RDC at the top and is collected in a surge vessel.
- Furfural is removed from the raffinate phase by flashing and steam stripping under vacuum.

- First, flashing takes place in the furfural column operating at atmospheric pressure.
- Heat being supplied mainly by condensing furfural vapour.
- The bottoms of this column are heated and furfural is flashed off in pressure flash column.

- The vapour of this column is condensed by heat-exchange and collect in the dry furfural accumulator.
- At the bottom still contains a few percent of furfural which is then removed by flashing and stream stripping under vaccum.
- Water, continuously introduced in to the system in the form of stripping steam.

- The overhead product of the stills is collected in the phase separator in to two layers.
- Wet furfural layer is fed to the top of column, which is returned after condensation to the phase separator.
- Dry furfural as bottom product.

Typical operating conditions

Process Variable	Feed stock				
	spindle HVI	Intermediate Neutral HVI	Intermediate Neutral LVI	Heavy Neutral HVI	Bright Neutral HVI
Temp.					
1.TOP	135	105	122	85	130
2.BOTTOM	55	72	60	80	90
3.FEED RATIO	2.5	3.1	1.1	3.9	3.7

Thanks