Background

NMP (N-Methyl Pyrrolidone) Extraction process is used for extraction of aromatics from heavier lube distillates for improving viscosity index. Water is injected as anti-solvent to reduce the solvent power. IndianOil R&D embarked upon a study to identify a suitable cost effective co-solvent of NMP to make the process more flexible to process all lube feedstock and environmental friendly. This led for search of a co-solvent, which has lower solvent power and higher selectivity compared to NMP. IndianOil R&D conducted extensive laboratory studies including co-solvent screening, Liquid-Liquid equilibrium Extraction (LLE) studies in lab scale continuous countercurrent set up as well as scale up studies using extraction pilot plant for various lube feed stocks.

The process temperatures are in the range of 50–110 0C. The experiments conducted for different Solvent/ Feed ratio indicates raffinate yield gain of 2-3 wt% with the same quality with addition of about 20-30% co-solvent with minimum or no water addition.

Conventionally, steam stripping is used for solvent recovery. To make the process environment friendly, simulation studies were also conducted for solvent recovery system of Haldia Refinery to replace steam by nitrogen for stripping to find the effect of co-solvent.
This led to development of Green NMP Extraction Technology (NMP-Cosolvent Process with nitrogen stripping). The benefits of the technology are:

The process makes unit versatile to handle all lube feedstock, wide range of feed stocks from Lighter to heavier i.e. from Spindle oil to DeAsphalted Oil (DAO). Co-solvent is easily available indigenously. Co-solvent is cheaper than NMP thus reducing inventory cost and operating cost on account of solvent loss. Increased raffinate yield. Retrofits easily with existing NMP unit with minor hardware changes. Significant effluent reduction.

A patent has been filed for this process.

**Commercialization**

The plant trial run is planned at Haldia refinery after certain hardware modifications such as tank for storage of co-solvent, additional compressor and chiller for removal of traces of solvent from nitrogen from stripper, optional heat exchanger for cooling compressed nitrogen etc.

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