Lube Hydrofinishing Unit

Feed Stock :

DWO from SDU.

Catalyst :

HR 348 supplied by Procatalyse.High purity Alumina extrudat impregnated with Nickel and Molybdenum oxides

Purpose:

To improve color by removing Sulphur,Oxygen & Nitrogen in a reactor with Cobalt / Moly catalyst.

Quality Monitoring:

Color, K.V at 100 oC, VI.

Lube Hydrofinishing Unit

- Major reactions : Hydrodesulphurization, Mild hydrodenitrogenation, Olefins hydrogenation, mild aromatic hydrogenation, decomposition of heteromolecules.
- Sulphur is usually present as mercaptan, sulphides, disulphide and thiophenic sulphur. Sulphur is removed as H_2S.
- Nitrogen is usually present as Ammines and pyrrole, pyridine etc. More difficult reaction and ultimate product is hydrocarbon & ammonia.
- Olefins are present in low quantity & most of them are saturated during hydro finishing.
- Normally aromatics are not hydrogenated. Due to liberation of some aromatics rings towards the light compounds are stripped off to reach the required flash point. Thus results in slight VI improvement also.
- Oxygenated compounds are mostly removed in the solvent extraction step. If any remaining removed as water.
- As a result, color & color stability improves, mild VI improvement occurs

Hydro finishing Unit :

Main operating Variables :

- Temperature: optimum to achieve desulphurization. Lower the temp, higher is the product viscosity & yields
- Partial Pressure of Hydrogen : Increase favors the reaction & reduces coke by avoiding polymerization reaction. Can be modified by change in total pressure and recycle ratio. Total pressure kept maximum compatible with the equipment
- Space Velocity : Hourly volume flow rate of feed wrt to the catalyst volume. Lower is the space velocity higher the severity. (0.75-1.3 m3 of feed per m3 of catalyst)
- Mole ratio of hydrogen/hydrocarbon: Includes quantity needed for hydro finishing + quantity which increases the partial pressure of hydrogen
- Feed quality: Higher the impurities higher the severity

Hydro finishing Unit
Operating Parameters

- Reactor inlet temp : 270-340 deg C
- Reactor outlet temp : 360
- H2 partial pr. At reactor outlet : 45 kg/cm2g
- Space velocity : 0.84 to 1.45 m3 of feed per m3 of cata
- H2 recycle : 153 liters of pure H2 per litre of oil feed at 1 deg C
- Absorber (C-1) : 35.5 kg/cm2g/62.5 deg C
- Stripper, (C-2) : 0.25 kg/cm2g /250 deg C
- Vacuum Drier (C-3): 50 mm of Hg/249 deg C
- 1st HP Separator (B-2) : 66.5 kg/cm2g/250 deg C
- 2nd HP Separator (B-3) : 65.5 kg/cm2g/50 deg C
- LP Separator (B-4) : 5.0 kg/cm2g/250 deg C

Wax Hydrofinishing Unit

- Reactor inlet/outlet pr. : 135.5/134 kg/cm2g
- Reactor inlet/outlet temp : 300 def C
- Liquid Hourly space velocity : 0.25 hr-1
- Hydrogen Partial pressure : 100 kg/cm2g
- Hydrogen to Hydrocarbon mole ratio : >500
- Hot HP separator : 180 deg C/132 kg/cm2g
- COld HP separator : 40 deg C/131.7 kg/cm2g
- HP Purge : 36 deg C/66 kg/cm2g
- LP Seperator : 185 deg C/6.0 kg/cm2g
- LP Purge : 40deg C/4.4kg/cm2g
- Liquid in to stripper : 185deg C/0.3 kg/cm2g
- Liquid MCW ex drier : 180deg C/0.082 kg/cm2g