

MODULE -8

Lube oil manufacturing

Q1: What is the principle of propane deasphalting?

A1: Liquid propane is a good solvent for hydrocarbon oil and mainly rejects heavy hydrocarbons (asphaltenes) and non hydrocarbons present as asphalt in the vacuum residue. Propane has unusual solvent properties in that from 40 to 60°C paraffins are very soluble in propane, but the solubility decreases with an increase in temperature until at the critical temperature of propane [206°F (96.8°C)] all hydrocarbons become insoluble. In the range of 100 to 206°F (40 to 96.8°C) the high molecular weight asphaltenes and resins are largely insoluble in propane. Extracted oil is known as deasphalted oil, which is suitable lube oil base stock (LOBS) for making high viscosity lubricant.

Q2: Give name of the solvents being replaced due to their toxic nature?

A2: (2) Liquid SO₂ need replacement with H₂O solvent. **(2)** Phenol extraction of lubes is being displaced by NMP.

Q3: Define waxes along with the examples?

A3: Waxes are large MW Paraffinic compounds having melting point 32- 100 °C. High viscosity Index lube oil cuts: contain large amount of wax.

Q4: Write temperature and pressure values for cold pressing technique of dewaxing along with situation where we can not use this technique?

A4: Cold Pressing

T=-17 °C (0° F)

P=35°C to 300°C

For microcrystalline wax cold pressing cannot be used because these wax either pass through filter or may clog it.

Q5: Write about urea dewaxing along with its major advantage?

A5: Urea forms solid filterable complex (adducts) at room temperature with large paraffin ($> C_{18}$) HC_s with no branching. To increase the rate of adduct formation some activator (methanol) is added.

Q6: Write briefly about solvent power and effect of temperature on it?

A6: Solvent power should have high power for aromatics would lead to lower S/F for given aromatics extraction capability. Solvent Power generally decreases with increasing selectivity. T increases the solvent power (exception is propane deasphaltive).

Q8: Write the impact of interfacial tension on solvent properties?

A8: (1)High IFT permits rapid settings due to easier coalescence.(2)Low IFT facilitates dispersion (drops are smaller & more interfacial area for mass transfer) whereas too low IFT lead to emulsification and coalescence.(3)Density difference between disperse & continuous phase S must be large for ease of setting of phases.(4)Viscosity: High viscosity of either phase reduces master efficiency.(5)Low viscosities are preferred for rapid setting of phases (more viscosity phase is usually dispersed).(6)Low viscosity is preferred for ease of pumping.

Q9: How wax content affect the pour point?

A9:Lower wax content: lower the pour point.Dewaxing is done to lower the pour point.

Q10: List various dewaxing processes?

A10: Dewaxing Process:

(1)Chilling & Pressing (Filtration).(2)Solvent Dewaxing.

(3)Urea Dewaxing- Urea forms complex compound with large chain paraffin i.e. wax range higher molecular weight of HCs but not within the lubrication oil some m.w paraffins

Q11: Which is the major solvent used for dewaxing and briefly explain its action?

A11: Most widely used solvent are MEK or propane.

Ketone (MEK) – used to maintain wax solubility. It Causes the wax to solidify in a easy of filterable form.

Q12: Write briefly about isodewaxing?

A12: Isomerizes a significant portion of the wax to lubes. Selective for mid distillates By products.