



Thermal Cracking Processes

Lecture 10

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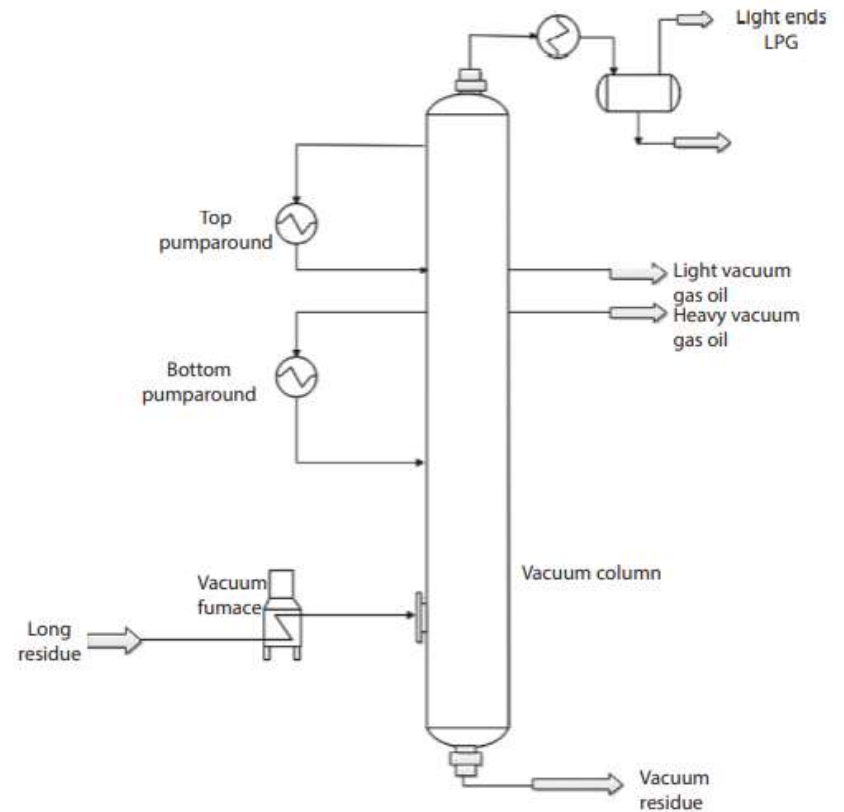
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Pressure Drop

- The pressure drop that occurs between the barometric condenser and the vaporizer section of the column is essential, as the purpose of vacuum operation is to produce a low effective pressure at the vaporizer, and thus the vacuum must not be lost by excessive friction loss through the vapor line, condensers and column plates.
- Avoiding a few millimeters (mm) of pressure drop from the barometric to the vaporizer can save many pounds of process steam as the saving in the quantity of steam is important.

Vacuum Distillation Operation

- The operation of vacuum column is similar to that of crude oil distillation (atmospheric) column with refluxes, side strippers, pumparounds, steam injection, etc., except that the operation is under vacuum conditions. Figure beside shows a schematic of high-vacuum distillation column for processing long residue to waxy distillate and short residue, respectively.



Steps of fractionation in the vacuum distillation

- This process has more internal reflux, and the side products are drawn to meet specified viscosities and other related properties that are important for lubricating oils.
- Not all topped crude oil is suitable for the production of lubricating oils. For asphalt type crude oils, the vacuum column bottoms product is used to make the road asphalt.
- For other types of crude oils, the material is charged to a coking process, where it is cracked to petroleum coke and low-grade gas oils.
- The gas oils from the coking process must usually be treated to remove sulfur and nitrogen before they are suitable for charge to cracking units

Process Description

- What are the causes of losses of products and equipment fouling in the atmospheric pressure distillation?
 - Highest temperature is required in the equipment, and thermal cracking would occur- heavier fractions of crude oil will cracked.
- Why heavier fraction is fractioned under vacuum condition?
 - Distillation is carried out with an absolute pressure in the tower flash zone area of 25-45 mm Hg.
- What we can do to enhance the vaporization in the distillation column?
 - To enhance vaporization, the pressure is lowered even further to 10 mm Hg.
 - Addition of steam increases the furnace tube velocity and reduces the coke formation as well as decreasing the total hydrocarbon partial pressure in the vacuum tower.

