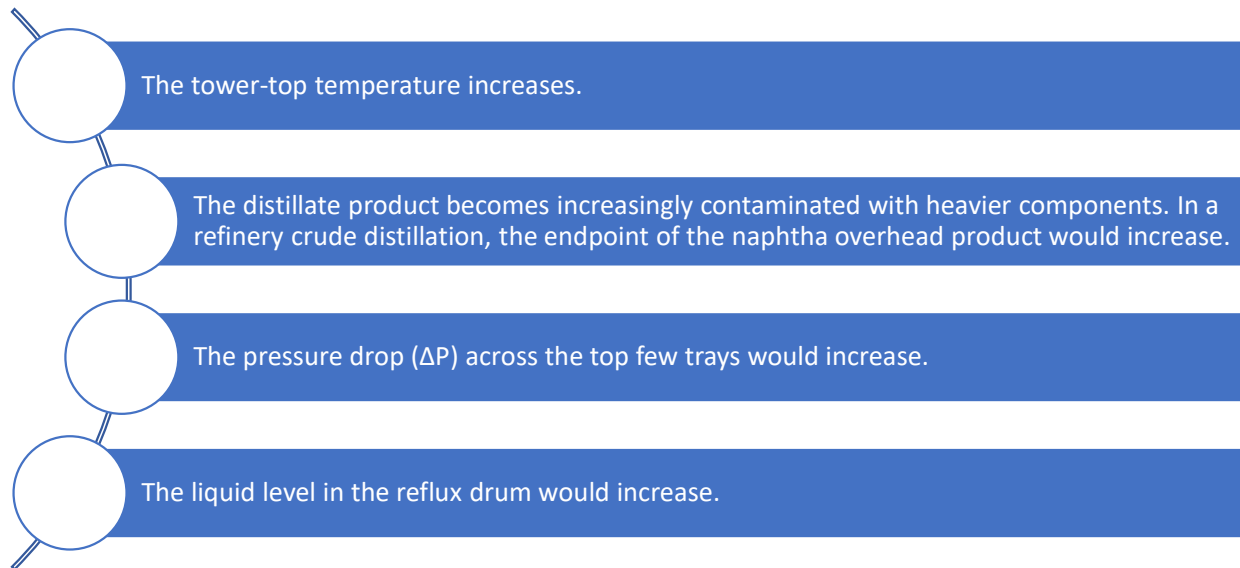


The reflux arrangements in atmospheric crude distillation unit (CDU)

Part 2

Another Purpose of the Pumaround

- Another purpose of the pumaround is to suppress top-tray flooding. For example, if tray 1 or 2 floods, the following would occur:



What is the indication of flooding in the distillation column? How it is corrected?

- If the reflux rate is increased to reduce the tower-top temperature, the top temperature will increase further rather than decrease. This is an indication of top-tray flooding. This is corrected by increasing the pumparound duty.

Tower Pressure Drop and Flooding

- A characteristic of process equipment is such that the best operation is attained at neither a very high nor a very low loading.
- The intermediate equipment load that results in the most efficient operation is known as the best efficiency point.
- For distillation trays, the incipient flood point corresponds to the best efficiency point.

Flooding and Entertainment Demonstration



Correlation to find Efficiency

- Correlations have been carried out to determine the best efficiency point for valves and sieve trays and are determined by:

$$\Delta P = K \frac{(NT)(TS)(SpGr)}{28}$$

where

ΔP = pressure drop across a tray section, psi

NT = the number of trays

TS = tray spacing, in.

SpGr = specific gravity of clear liquid at flowing temperatures.

K = 0.18 to 0.25: Tray operation is close to its best efficiency point.

K = 0.35 to 0.40: Tray is suffering from entrainment—increase in reflux rate, noticeably reduces tray efficiency.

K = ≥ 0.5 : Tray is in fully developed flood—opening a vent on the overhead vapor line will blow out liquid with the vapor.

K = 0.10 to 0.12: Tray deck is suffering from low tray efficiency, due to tray deck leaking.

K = 0.00: The liquid level on the tray is zero, and quite likely the trays are lying on the bottom of the column.