Thermal Cracking Processes Coking

Yield Correlations for Flexi-coking

Lecture 15

Yield Correlation for flexi-coking

- The yield correlations for flexi-coking are based on the ==*Conradson carbon content*== of the vacuum residue (CCR, wt%), its °API gravity and sulfur content (Sf).

- Correlations based on data compiled by ==*Maples*== are expressed in weight percent yields as:

$$\text{Gas wt\%} = 0.171943 \times \text{CCR wt\%} + 5.206667$$

$$\text{Gasoline wt\%} = -0.115234 \times \text{CCR wt\%} + 18.594587$$

$$\text{Coke wt\%} = 1.037233 \times \text{CCR wt\%} + 1.875742$$

$$\text{Gas oil wt\%} = 100 - \text{Gas wt\%} - \text{Gasoline wt\%} - \text{Coke wt\%}$$

Gas composition:

- C_4 wt% = −0.028627 × CCR wt% + 3.200754

- C_2^- wt% = 0.647791 × [Gas wt%–C_4 wt%] + 0.456001

- C_3 wt% = Gas wt% − C4 wt% − C_2^- wt%

Sulfur distribution in products:

- S wt% in Gasoline = 0.193461 S_f

- S wt% in Gas oil = 0.91482 S_f + 0.16921

- S wt% in Coke = 1.399667 S_f + 0.18691

- S in Gas = S in Feed − S in Gasoline − S in Gas oil− S in Coke

Gravity of flexi-coker feed and gas oil

- Feed $API_f = 0.5 \times CCR$ wt% $+ 0.932644$

- Gas oil API $= 1.264942 \times API_f + 0.506675 \times CCR$ wt% $- 0.79976$

- A vacuum residue of Conradson carbon residue (wt% CCR= 15) is fed into a delayed coker at a rate of 350,000 lb/h of API = 8.5 and a sulfur content of 3.0 wt%. Determine the amount of yield (lb/h) and their sulfur content. Calculate the yields of liquid products in BDP.