
Question 91: In a catalytic reformer with a given pressure, severity, and feed quality (N+2A), what are the major factors that determine the C5+ yield? How do you optimize yield? Have you quantified the impact of pentane and/or hexane content in the feed?

Michael Newton (Roddey Engineering)

Setting pressure, severity, and feed quality limits you on any significant “knobs to turn” in determining the C5+ yield. If you assume that LHSV is also fixed, there are two factors that can impact C5+ yield.

Reactor Inlet Temperature Profile – typically running a “downhill” profile will give you a slightly higher C5+ yield and will lower overall coke make in the unit.

Water Chloride balance – having an over-chlorided catalyst will result in more cracking and lower C5+ yields. Under-chlorided – higher deactivation, higher yield, higher temp required.

Yields can be optimized by maintaining a good water chloride balance and working with your technology supplier or consultant in determining the best temperature profile and recycle gas rate to obtain the desired cycle length or total coke make.

Rick Grubb (Chevron USA)

We’ve noticed that catalyst fouling and feed distillation have an effect on C5+ yield in addition to the items listed above. As the catalyst fouls the C5+ yield decreases. We’ve also seen that as the distillation gets heavier near the endpoint the C5+ yield also decreases. As the distillation gets heavier near the initial boiling point the C5+ yield increases slightly. With that said, we don’t typically push for C5+ yield as much as we consider it a result from the other refinery optimizations. We target the crude distillations to maximize the product slate for optimum profits and octane blending between the chemical plants and the mogas blending demands. In other words, the short range planners take distillation and catalyst age into account when choosing distillations and octanes.

We do monitor the C5+ yield to ensure the unit is operating well. We’ve implemented process monitoring standards to ensure consistent overview between the different units and engineers. These standards allow for consistent monitoring techniques and help bridge gaps between personnel transfers.

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