Question 23: What are the operating strategies for C5/C6 isomerization units with current fuels regulations? Are units being run primarily for benzene saturation withchanges in operating parameters, feed sources, and treating being made to account for seasonal differences in gasoline pool RVP?

ADAMS (HollyFrontier Corporation)

The answer is basically ‘yes.’ We are looking at isomerization units as benzene polishers for the light straight-run. Sometimes the light straight-run has too much benzene in it and a BenSat™ unit would be more appropriate for benzene conversion. The isomerization unit is an economic unit in the refinery. If you have space in the isomerization unit and room in the gasoline pool, then you can bring in natural gasoline, take out the C5s, and put the remainder through the isomerization unit. As long as it all fits and you can manage the RVP, then you can use it for that as well.

MELDRUM (Phillips 66)

With ethanol blending, we find that the octane benefit of isomerate is not near as great as it was in the past. Ethanol with a 108 research octane number will give a blend pool increase of around 3 to 6 octane numbers using a 10% blend, accounting for some blend interactions. Isomerization will give about 20- to 25-number increase in the C5/C6 stream, from 60 octane up to 80 to 85 octane. The result on the blend pool would then be an increase of 1 to 2 octane numbers based on a 5 to 10% isomerate blending. There is a much more significant impact from the ethanol than from the isomerate.

Benzene saturation on the isomerization unit should be limited to avoid that excessive heat release which will sub-optimize the isomerization unit equilibrium performance. Benzene saturation will release around 17°F per percent benzene, resulting in a practical limit of around 3 to 5% benzene in the feed entering the isomerization reactor. Feeds to the unit might be slightly higher; but if diluted down with recycle, they can be handled on the isomerization unit. In our system, we do not see much effect from seasonal adjustments on the isomerization operations based on the seasonal vapor pressure specifications.

ADRIÁN GUZMÁN (YPF Tecnología S.A.)

Taking into account the downsides associated with C5/C6 isomerization, do you see any potential for the development and commercialization of C7 isomerization technologies?

ADAMS (HollyFrontier Corporation)

Not on purpose for that material. If we can, we will lead it in a separate blend stock and try to blend it straight into the gasoline pool. Once you start getting heavier, you start to crack; so that is the downside of putting the C7s in the isomerization unit.

ADRIÁN GUZMÁN (YPF Tecnología S.A.)

I was referring to specifically designed technologies and catalysts for C7 isomerization. There have been many research activities associated with this in many companies. There are some patents out there but still no commercial experience with this kind of technology. The research is there; the patents are there. So, the question was if you see any potential for this kind of technology becoming commercial and used within the industry?

BULLEN (UOP LLC, A Honeywell Company)

We have seen interest specifically for EU5 (European Union)-type formulations. There are some refinery configurations where they will have difficulty meeting the specifications. Without getting into details, the use of C7 isomerization can allow one to change the aromatics content of the reformate while upgrading the C7 material to a higher octane and improving the overall yield of the whole naphtha-range material.

MARK ADAMS (HollyFrontier Corporation)

The light straight-run gasoline benzene content may be low enough in some refineries (Tulsa and El Dorado) to allow it to be put into an isomerization unit without causing operating problems or to run straight into gasoline blending without going through isomerization or benzene saturation (Cheyenne). In Woods Cross, a BenSat™ unit was added for C6 material that will not fit in the existing isom.

Tags

Aromatics

Blending

Catalysts

Isomerization

Reactor Vessel

Reforming

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