DTL™ Process Technology

No Need to Burn Money Anymore

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DTL™ at a Glance

Converts light olefins destined for fuel gas into high-octane gasoline blend stock

Value driven by the spread between Gasoline Blend-stock value and replacement Fuel Value (if any)

Applicable to FCC, RFCC, DCC or Coker off-gas feed

High olefin conversion (>95%), high liquid yield (85% C4+/ 75% C5+) and high octane (93-94 RON)

Low CAPEX/OPEX, Small Footprint, Standard Refinery Equipment

13 Commercial plants in operation
TOPICS

KOCH-GLITSCH - IPT PARTNERSHIP

THE DTL™ TECHNOLOGY

DTL™ CASE STUDIES

WRAP UP & QUESTIONS
Koch-Glitsch and IPT Partnership
WE ARE KOCH

Commodity Trading
Electronic Components
Energy
Fertilizers
Forest and Consumer Products
Process and Pollution Control Equipment and Technologies

Minerals
Polymers and Fibers
Ranching
Refining, Chemicals and Biofuels
Glass

INVISTA is an independently managed, wholly owned subsidiary of Koch Industries, Inc.
In 2004, subsidiaries of Koch Industries, Inc. acquired INVISTA.

*Koch revenues fluctuate with the price of commodities. They have been estimated by Forbes as high as $115 billion.*
IPT – KG Partnership

IPT is INVISTA’s technology transfer business with more than 40 years in continuous licensing.

Licensed more than 100 license projects for PTA, Polyester, BDO, PTMEG and Nylon 66 since joining KII in 2004.

Supporting technology development, commercialization and licensing within KII since 2013.

Entry into the refining space spawned by collaborations with KII Affiliates, Flint Hills Resources and Koch-Glitsch.

IPT-KG Partnership to Offer DTL™ and other Refining Technologies to the Market.
DTL™ Process Technology
CATALYST - THE HEART OF THE PROCESS

Complex metal modified, Nano-size ZSM-5

DTL™ catalyst oligomerizes, isomerizes and aromatizes the reactants and intermediate products

A variant of the catalyst used in our IsoA™ Process has the added capability to dehydrogenate C5-C7+ paraffinic feed to produce high octane blend-stock from these low value feeds.
DTL™ INTEGRATION INTO THE REFINERY

Typically integrated downstream of the off-gas FCC amine treater

Olefin-rich gas is processed through the DTL™ plant with olefin lean gas returned to the fuel gas header.

Supplemental fuel addition (e.g. natural gas) or partial bypassing of the DTL™ process are options for maintaining the fuel gas header pressure, if required

The DTL™ process unit operations are standard for refineries (fixed-bed reactors, absorption column, fired heaters, etc.), with a wide operating window for ease of operation

The compact footprint increases options for facilities siting and supports modular construction
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Option to Co-Feed olefin containing LPG

Recovery process customized for integration with the refinery
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DTL™ CASE STUDY

Low CAPEX configuration – LCO absorption with rich LCO returned to the main fractionator

55,000 pph dry gas feed

26 wt.% C2=; 6% wt.% C3=
CONCLUSIONS

LOW CAPEX, LOW OPEX, SIMPLE EQUIPMENT AND WIDE OPERATING WINDOW

WHY BURN THE OLEFINS FOR FUEL VALUE WHEN DTL™ CAN CONVERT THEM TO HIGH OCTANE GASOLINE BLEND-STOCK?

INVISTA, IN COLLABORATION WITH KOCH GLITSCH, WILL CUSTOMIZE THE PROCESS AND CUSTOMIZE THE EXECUTION APPROACH TO MATCH YOUR NEEDS

GIVEN THE FEED FLOW RATE, COMPOSITIONS AND A FEW OTHER DETAILS, WE CAN QUICKLY COMPLETE AN ECONOMIC SCREENING AND JOINTLY DECIDE IF THERE IS A PROJECT WORTH CONSIDERATION

OUR IsoA™ TECHNOLOGY, UTILIZING A VARIANT OF THE DTL™ CATALYST, CAN TURN YOUR C5-C7+ PARAFFINIC STREAMS INTO HIGH OCTANE BLEND-STOCK ALSO
THANK YOU

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STRAIGHT-RUN NAPHTHA UPGRADING PROCESS FLOW

Converts low-value light paraffinic naphtha into high-value gasoline

Feeds: light naphtha, topped oil, raffinate oil, reformate, NG condensate... C5 to C7+ paraffinic naphtha

Products:
  ~80% to 85% gasoline
  ~15% LPG
  <2% dry gas (C1/C2)

90+% sulfur removal, <10 ppm product with feed <120 ppm does not require Sulfur Removal Step

20+ point increase in octane (typical)

RVP control to seasonal spec

Type and Process Location of Sulfur Removal is dependent on Feed Sulfur Content plus Dry Gas and Gasoline Sulfur Specifications

Recovery process customized to the feed composition
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Co-feed of olefin containing LPG, boosts octane 2-5 points, lowers reactor temp, reduces heat input and improves yield