UniSim® Design Suite
Catalytic Naphtha Reformer
Product Information Note

High fidelity kinetic reactor module helping refiners convert low-octane petroleum naphtha into high-octane reformate (gasoline and aromatics-mode BTX)

The Challenge: Meet Demands for High Octane Fuel & Chemicals Feedstock

Refiners are under pressure to make timely business decisions while designing and operating efficient, safe and profitable plants. In an increasingly competitive global market, they must accurately analyze the economic and processing feasibility of available crude oil feedstocks, and then make the optimal choice while reliably producing on-spec products.

Feedstocks constantly vary in quality, cost, and availability, while refinery products and their markets are very dynamic with regards to demand, pricing, and specifications.

Unfortunately, refineries of all sizes are losing operational knowledge and insights due to the retirement of experienced personnel. They also face the challenges of recruiting, hiring and training a new generation of workers on refining and petrochemical processes, which are inherently complex and often hazardous.

The Opportunity: Optimize Catalytic Reforming Based on Production Targets

Refiners throughout the world utilize catalytic reforming to produce high-octane reformate for gasoline blending and aromatics such as benzene.

WHY DO CUSTOMERS CHOOSE OUR SOLUTION?

- Handles all naphtha feedstocks, including hydrotreated naphtha, naphtha from catalytic crackers, hydrocrackers and cokers
- Specifically intended for motor gas production applications
- Supports aromatics-mode BTX for chemicals production
- Configurable for various catalytic reformers, including semi-regenerative fixed-bed, cyclic fixed-bed, and continuous reformers
- Reduces the time required for configuration via typical processing scheme templates
- Improves reactor calibration to tune kinematic parameters utilizing engineering data or real plant data
- Determines the best-fit model depicting plant configuration and conditions through kinetic parameter optimization
- Robust model accurately matches and predicts process performance
toluene and xylenes (BTEX) for petrochemicals. A high value-added unit, the catalytic reformer is also a major source of refinery-based hydrogen employed in various hydro-processing operations.

Decision support for planning, scheduling and production for catalytic reformers is critically important to refineries. Engineers at these facilities need to answer key questions such as:

- What is the best way to meet growing customer demand and provide cleaner-burning, high-octane fuel?
- What alternative feedstocks exist for naphtha processing?
- What are the best available feeds and their severity in the unit?
- What are the temperature and metallurgy limits of furnaces and other processing equipment?
- How can we increase the volume of gasoline produced per barrel of crude oil?
- How can we optimize the octane rating of reformates?

The Solution: UniSim Design Catalytic Naphtha Reformer

Honeywell Process Solutions is recognized for providing advanced software solutions enabling customers in refining and other industries to capture and share process knowledge, improve plant profitability, and maximize the return on their technology investments. For example, our UniSim software family substantially improves simulation of online and off-line process unit design and optimization applications. It also helps determine the workflow, equipment needs, and implementation requirements for a particular process.

The UniSim solution is part of the Honeywell Connected Enterprise, which connects processes, assets and people to make the most of plant data and process domain expertise.

The UniSim Design Suite provides intuitive process modeling software that enables process engineers at refineries to create steady-state and dynamic models for plant design, performance monitoring, troubleshooting, business planning, and asset management. UniSim simulation technology also helps engineers gain the expertise they need to work with a host of complicated refining processes.

UniSim Design Suite now includes modules representing specific refining operations. The UniSim Catalytic Naphtha Reformer is one of the latest offerings in the UniSim Refining portfolio. This solution is available within the next generation UniSim EO environment. The UniSim Catalytic Naphtha Reformer can be configured within the EO environment, together with other unit operations to represent the entire catalytic reforming unit. UniSim EO also allows for design and optimization in the same environment.

In an increasingly competitive global market, refiners must accurately analyze the economic and processing feasibility of available feedstocks, and then make the optimal choice.

Figure 1: UniSim Catalytic Naphtha Reformer can be configured within the UniSim EO environment together with other unit operations.

The UniSim Catalytic Naphtha Reformer represents a high fidelity, kinetic naphtha catalytic reforming reactor. This refining reactor converts low-octane petroleum naphtha into high-octane gasoline (reformate). Additional products include aromatics (BTEX) and Hydrogen (H₂). Typical naphtha feedstocks are hydro-treated naphtha (straight-run naphtha from the crude unit is the most common feed), but gasoline-range streams from catalytic crackers, hydrocrackers, cokers and visbreakers can be routed to the catalytic reformer to increase their octane numbers.

The UniSim Catalytic Naphtha Reformer can be configured either as a fixed-bed (semi-regenerative or cyclic) or a continuous catalytic reformer. Key reactions include:
Dehydrocyclization of Paraffins
Dehydrogenation of Naphthenes
Hydrocracking and Dealkylation
Isomerization of Paraffins to Isoparaffins

The Benefits

Ease of Use

The UniSim Catalytic Naphtha Reformer is a cost-effective solution that eliminates the need for specialist consultants. This software enables refinery engineers to customize the naphtha reformer to a particular plant and its operating strategy. Effective simulation models can be deployed with just a handful of clicks.

Better Performance

The UniSim Catalytic Naphtha Reformer helps refiners determine the best feeds and severity in their catalytic reformer in order to meet their hydrogen and octane operational targets. Improved unit performance directly impacts the bottom line.

Expert Insights

The UniSim Catalytic Naphtha Reformer software is backed by the domain expertise of Honeywell Process Solutions and leverages the deep insights of Honeywell UOP.

UniSim Design Suite Support Services

This product comes with worldwide, premium support services through our Benefits Guardianship Program (BGP). BGP is designed to help our customers improve and extend the usage of their applications and the benefits they deliver, ultimately maintaining and safeguarding their advanced applications.

Honeywell provides a complete portfolio of service offerings to extend the life of the plant and provide a cost-effective path forward to the latest application technology. The services include:

- Standard and Customized Training
- Consulting
- Model Building
- Engineering Studies
- Custom Thermo/Unit Operations

Why Honeywell

With over 40 years of worldwide experience in the refining industry, Honeywell provides proven technologies to support a quick and safe refinery start up, and efficient operations. Our solutions enable refiners to meet today’s demands in innovative and effective ways, lowering costs while reducing risks, optimizing processes, and maintaining the newest and best infrastructure to support their business and operational needs.

Honeywell Process Solutions is committed to providing a wide range of software solutions for refining and petrochemicals. By combining our best-in-class automation technology with proprietary know-how of plant and process design from Honeywell UOP, we provide the largest portfolio of products and services available to refining companies. This includes solutions for automation & process control, advanced applications, regulatory compliance, and operator performance.
For More Information
Learn more about how Honeywell’s UniSim Catalytic Naphtha Reformer can improve performance, visit www.honeywellprocess.com or contact your Honeywell Account Manager.

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