UniSim® Design Suite Isomerization Reactor

Product Information Note

High-fidelity kinetic reactor module helping refiners increase octane numbers, improve product yields, and enhance the performance of their gasoline blending pool

The Challenge: Improve Gasoline Quality to Satisfy Customer Requirements

Petroleum refiners have a difficult task in optimizing isomerization reactors, which produce key components in their gasoline pool. The ability to utilize a choice of crudes has a direct impact on yields and allows processing of value-added products to improve the bottom-line.

Operators must find ways to minimize benzene in their blending pool to meet environmental standards and, at the same time, increase octane ratings. They can no longer run light Naphtha through a Naphtha reformer and still meet rigorous benzene specifications.

The Opportunity: Optimize Isomerization to Increase Octane Numbers

Due to the nature of isomerization, operating companies need expert decision support to accurately predict yields from reactors. Engineers face questions such as:

- How can we enhance our gasoline pools using pentane-hexane fraction?
- How can we address the variables affecting our isomerate octane numbers?

FEATURES AND BENEFITS

- Proven technology backed by decades of refining industry experience and UOP know-how
- Best-in-class support services through Honeywell’s Benefits Guardianship Program (BGP)
- Robust solution built on the UniSim® EvOluition high-performance, next generation platform, which enables process design and optimization under the same environment
- Reduces engineering costs by creating models that can be leveraged throughout the plant lifecycle
- Displays KPIs related to reactor operation in an intuitive graphical user interface
- Helps users determine yields and best operating strategies to reach production targets, and generates LP vectors for scheduling and planning purposes
- Refining model allows "what if" scenarios of how one processing unit influences another
- Enables refinery-wide simulation to improve operating performance
• How can we improve feed composition and operating conditions in isom units?
• How can we upgrade low-octane streams and eliminate benzene?

The goal for any refiner is to improve its dollar-per-barrel operating margin. This requires a solution to expand feedstock options, reduce energy and maintenance costs, and produce higher quality petroleum products.

The Solution: UniSim Design Isomerization Reactor

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 conversion reactors. The UniSim Isomerization Reactor is one of the latest offerings in the UniSim Refining portfolio. This solution is built on the next-generation UniSim Equation Oriented (EO) modeling platform, which solves all equations simultaneously (rather than sequentially) and provides comprehensive, model-wide optimization. The isomerization reactor can be configured within the UniSim EO environment, together with other unit operations. It fits into Honeywell’s overall UniSim refining model with interconnected processes allowing simulation and “what if” scenarios of how one processing unit influences another. The result is a larger, refinery-wide simulation of how to run operations to produce more valuable and salable products.

Figure 1: Honeywell’s isomerization reactor can be configured within the UniSim EO environment, together with other unit operations.

The UniSim Isomerization Reactor is specifically designed for simulating light Naphtha isomerization. This solution supports the following reactions:

• Paraffin Isomerization
• Aromatic Hydrogenation
• Naphthene Isomerization
• Ring Opening
• Cracking

The UniSim Isomerization Reactor represents a high-fidelity kinetic isomerization reactor module. It can be configured as either a C4 or C5-C6 isomerization reactor. C4 isomerization provides suitable feedstock for alkylation, and C5-C6 isomerization increases the octane number in light Naphtha and manages content of benzene in gasoline products. The reactor also supports a hydrocarbon once-through option, and allows users to setup a two-bed reactor with lead-lag configuration.
The Advantages

Greater Insights
Leveraging the proven know-how of Honeywell UOP, the UniSim Isomerization Reactor helps operators to:

- Understand the impact of processing different feedstocks and changing cut-points on crude units
- Analyze how adjustments to the cut-point on the Naphtha splitter relate to the performance of the combined reformer/isomerization operation, including yields, downstream separation and gasoline blending
- Perform reliable predictions to reduce the cost of hydrogen consumption

Improved Operation
The UniSim Isomerization Reactor is a cost-effective solution that provides access to Key Performance Indicators (KPIs) related to isom unit operation in an intuitive graphical user interface. The KPIs include (but are not limited to):

- Paraffin Isomerization Number (PIN)
- Research Octane/Motor Octane (RON/MON)
- Product Yield

The software also includes typical processing scheme templates to reduce the time required for configuration.

Enhanced Performance
The UniSim Isomerization Reactor enables refiners to optimize reactor temperature to maximize RON. Reactor calibration is based on engineering data or real plant data to tune kinetic parameters. The solution also supports:

- Kinetic parameter optimization to help determine the best-fit model depicting the plant configuration and conditions
- Accurate prediction of process performance

- Greater understanding of LP programs for scheduling and planning purposes

Figure 2: UniSim Isomerization Reactor provides access to KPIs related to isom unit operation in an intuitive graphical user interface.

Knowledgeable Support
The UniSim Isomerization Reactor software is backed by the domain expertise of Honeywell Process Solutions and the deep insights of Honeywell UOP, which cover all aspects of the refining and petrochemical field. Customers can rely on Honeywell’s Global Technical Assistance Center (GTAC) for the help they need, no matter where they are located.

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 Isomerization Reactor can improve performance, visit [www.honeywellprocess.com](http://www.honeywellprocess.com) or contact your Honeywell Account Manager.

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