HALDOR TOPSØE

Solutions for naphtha hydroprocessing

Maximize the value of your naphtha **feedstocks** and downstream processes

Naphtha catalysts, graded bed solutions, and hydroprocessing unit design and revamping

topsoe.com

New solutions for changing needs

Lighten the burden of heavy feedstocks with Topsoe catalysts, process designs and technologies

If your refinery is like most, you're under pressure to squeeze more value out of heavier feedstocks, and this presents new challenges for catalysts. To name just one example, increasing use of coker feedstocks has led to higher silica and nitrogen levels in the naphtha streams, requiring catalysts with superior HDN activity and greater surface areas for maximum silica resistance and uptake.

For downstream units, naphtha pretreatment presents its own challenges, as the catalysts used in isomerization, catalytic reforming and other units are extremely sensitive to impurities such as sulfur, nitrogen, silicon and arsenic.

Our extensive range of catalysts and technologies are designed to handle all feedstocks and still ensure easy, reliable, stable and profitable hydroprocessing and pretreatment. Superior process designs, high-performance catalysts and proprietary equipment ensure significantly longer cycle length while increasing plant availability and reducing energy consumption.

High-performance naphtha catalysts

Boost profits from processing straight run, cracked, coker and FCC naphtha

Haldor Topsoe supplies market leading naphtha hydroprocessing catalysts for catalyst replacement, unit revamps, or grassroot units. We provide catalysts for straight-run, cracked and coker feedstocks, FCC naphtha, and for special applications in petrochemical plants and steam crackers.

Straight-run & cracked feedstocks

For naphtha hydroprocessing units processing straight-run naphtha or feedstocks containing blends of cracked material, we offer two types of NiMo catalysts: The TK-527 and the TK-569 HyBRIM™.

The TK-527 is a cost-effective NiMo catalyst that delivers excellent HDS activity and stable performance during operation. The low-density formulation keeps costs down, while still meeting low-sulfur-product specifications.

TK-569 HyBRIM™ is a high-activity NiMo catalyst for both HDS and HDN. It offers a unique combination of high activity and high stability for demanding naphtha services with feedstocks containing high amounts of cracked material, originating from thermal or catalytic conversion processes. This high activity can be used to increase cycle length, process tougher feedstocks, reduce catalyst poisoning in downstream units, and increase feed rates.

The TK-527 and TK-569 HyBRIM™ can also be used in petrochemical plants where gas or liquid stream treatment, such as sulfur removal or olefin saturation, is required.

Coker naphtha

Coker naphtha feedstocks present a number of challenges for effective hydroprocessing, including silica poisoning – which reduces cycle lengths – and excessive amounts of sulfur, nitrogen and olefins.

More than **200 units** *worldwide are relying on naphtha hydrotreating catalysts from Topsoe*

Our coker naphtha hydroprocessing catalysts, the TK-431, TK-437 and TK-439, feature a high specific surface area that ensures unmatched silica pick-up and tolerance without compromising on hydrotreatment activity. This enables your plant to maximize unit performace throughout the cycle length, reduce catalyst changeouts, and boost on-stream time.

The TK-431 and TK-437 also meet challenges posed by the higher amounts of sulfur, nitrogen and olefins found in coker-derived naphtha, by delivering high HDS and HDN activity while also limiting di-olefin polymerization. Both the TK-431 and the TK-437 are our recommended catalysts for di-olefin saturation. Note that diolefin hydrotreating is best carried out in a separate guard reactor operated at low temperatures (180–220°C).

The TK-439 features a higher silicon pick-up capacity and can be used in combination with the TK-431 or TK-437.

Post-treatment of FCC naphtha
If you have an FCC naphtha post-treatment unit, you'll need to make sure your unit can both remove sulfur and minimize the saturation of mono-olefins. The latter is critical because mono-olefin saturation leads to a loss in octane numbers.

Our TK-710 CoMo catalyst and TK-747 Ni catalyst have been specially developed to deliver high selectivity and activity for sulfur removal and minimal mono-olefin hydrogenation – keeping sulfur content low and octane numbers high.

We also supply catalysts for removing di-olefins in the selective hydrogenation unit prior to the removal of sulfur in the HDS reactor.

Other naphtha treatments
In addition to solutions for straight-run and cracked feedstocks, coker naphtha and FCC naphtha, we also offer catalysts for special applications in petrochemical plants and steam crackers. These catalysts are used when naphtha streams require sulfur removal, di-olefin saturation, selective hydrogenation and other hydroprocessing treatments.

30 years of experience supplying naphtha hydrotreating catalysts

In addition to our solutions for naphtha processing, we offer hydrotreating catalysts and technologies for all crude oil fractions. Built on over 40 years of experience, these solutions are empowering refineries around the world to meet product specifications at a lower cost and with higher profits.

TK-15

Inert grading, designed with hold-down capabilities to prevent catalyst milling.

TK-26 TopTrap™

Inert grading, uniquely designed to pick up iron scale and other contaminants.

3/16" ring catalyst

Large void grading to remove excess contaminants, and low activity to ensure control of highly reactive compounds.

1/8" ring catalyst

Large void grading to remove contaminants, and medium activity to ensure control of reactive compounds.

1/10" QL catalyst

Medium void grading to remove small contaminants, and medium-high activity to facilitate the transition to bulk catalyst.

1/20" TL bulk catalyst

High-activity bulk catalyst to meet product specifications and maximize the cycle length.

Grading – your weapon against pressure drops

Trust the experts who have supplied successful grading solutions for more than 40 years

Naphtha hydroprocessing units can experience pressure drops that lead to unwanted shutdowns. These pressure drops are normally linked to reactor bed fouling, which can be prevented by appropriate grading of the bed.

Our graded bed solutions include specialty traps for feed contaminants such as arsenic, silicon and corrosion products. We have supplied grading bed solutions for more than 40 years, and we invest heavily in the research and development it takes to meet emerging reactor bed challenges.

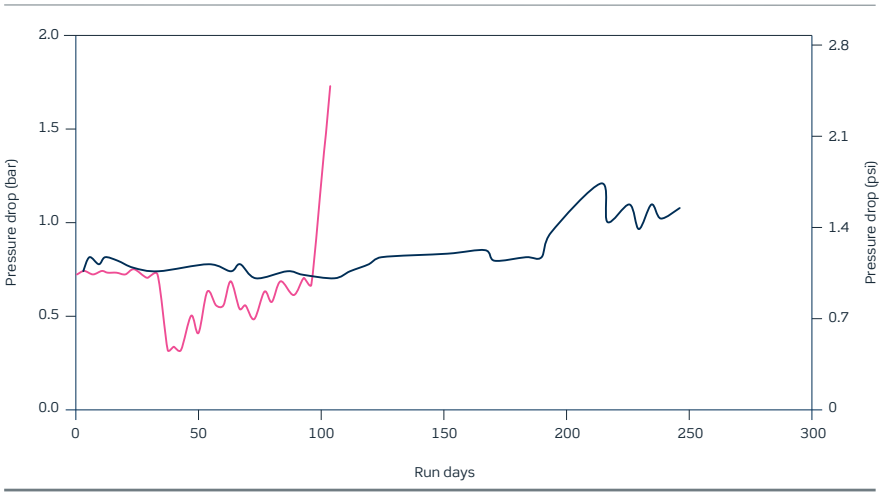
Corrosion products
Iron corrosion products can cause severe pressure drop problems in naphtha hydroprocessing units. Our TK-26 TopTrap™ solves the problem thanks to an optimized shape, large void fraction, and macroporous material that traps even very small particles. The result? Longer cycle lengths and avoidance of unplanned shutdowns.

Catalyst milling
Catalyst milling occurs from time to time in naphtha units where the gas rate is high and no distributor tray is used, or where inlet splash plates are poorly designed. To avoid catalyst milling, we recommend installing a top layer of our TK-15. The TK-15's optimized shape and very dense material deliver both high hold-down force on top of the bed and a high void.

Arsenic poisoning
Arsenic is a severe poison, and we strongly recommend installing arsenic guards in your naphtha hydroprocessing unit. Our guards, such as TK-49, feature high arsenic up-take, and can be tailored to your specific unit to ensure maximum protection of the bulk catalyst throughout the cycle length.

4,000 *grading catalyst charges supplied to date*

Pressure drop development over time



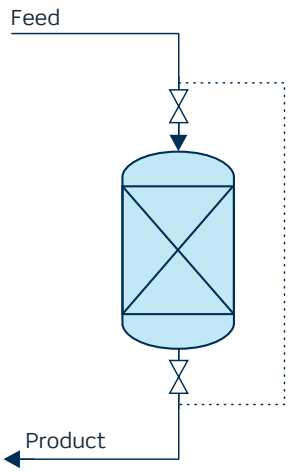
Hydroprocessing unit design and revamps with Haldor Topsoe technology

Whether you're starting from scratch or starting over with a revamp, we'll make sure your plant is designed for efficiency

In addition to our catalysts and grading solutions, our technologies and expertise can help you effectively revamp your existing naphtha hydroprocessing unit or design a grassroots unit from scratch.

Silicon swing reactors

A bypass configuration to the left, and a lead/lag reactor system to the right



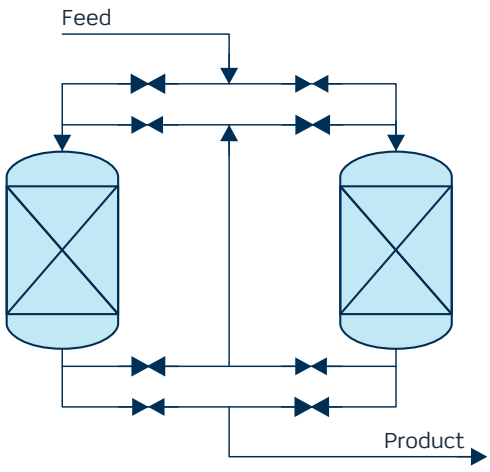


Figure 1 *Figure 2*

As a major technology licensor, we deliver complete basic engineering design packages, including revamp studies and detailed engineering reviews. And our design capabilities range from single-unit revamps to very large grassroots hydroprocessing facilities.

Figure 1
Topsoe silicon guard configuration designs offer numerous benefits over competing systems. Our bypass configuration can overcome pressure drop problems and keep your unit on stream while you change catalyst.

Figure 2
Our lead/lag configuration maximizes the silicon pick-up capacity of the catalysts installed in your two reactors and lets you replace the catalyst in one reactor while still running the unit at full capacity.

Related technologies

Discover the full range of Topsoe catalysts and technologies for optimizing performance at refineries

Optimized performance often means ensuring that multiple technologies and components are tuned to each other. If you're not already using them, please consider these related offerings from Topsoe.

Cl

Clorine absorbent
Effective chlorine absorbents are critical for protecting your catalysts and equipment and, ultimately, for ensuring cost-efficient plant operation. Topsoe's chlorine absorbents deliver superior chlorine uptake, regardless of your feed type or gas or liquid product stream.

C_6H_6

Benzene hydrogenation catalyst
Meeting gasoline specs often requires hydrogenation and benzene removal. Topsoe's benzene hydrogenation catalysts offer exceptionally high activity and the reliability it takes to ensure stable plant operation throughout the catalyst's lifetime.

S

Sulfur absorbent
Plant availability is critical to your bottom line, and sulfur poisoning can take a serious toll on availability. Our market-leading sulfur absorbents deliver superior sulfur uptake, protecting your isomerization, naphtha reformer and other downstream units.

Why partner with **Haldor Topsoe**

The Topsoe advantage lies not just in individual solutions, but in how our solutions work together

When you partner with Haldor Topsoe, you partner not only with the world's leading technology licensor and supplier of hydroprocessing catalysts. You also partner with a company that takes a uniquely holistic approach to your plant and your business.

When we look at your plant, we look at the big picture – and then apply the full breadth of our expertise to deliver a thoroughly tailored solution, where individual components work together to maximize your plant's performance and your business success.

Haldor Topsoe is a world leader in catalysis and surface science. We are committed to helping our customers achieve optimal performance. We enable our customers to get the most out of their processes and products, using the least possible energy and resources, in the most responsible way. This focus on our customers' performance, backed by our reputation for reliability, makes sure we add the most value to our customers and the world.

Get in touch today
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Haldor Topsoe A/S, cvr 41853816 | CCM | 0053.2015/Rev.0

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