Fact sheet

Shell Catalyst & Technologies: Purification solutions

ADSORBENTS AND GUARD BEDS

Contaminant removal from your feeds that protects your catalysts and extends your cycle times

SHELL CATALYSTS & TECHNOLOGIES
TRANSFORMING ENERGY TOGETHER

AT A GLANCE

CUSTOMER DRIVERS

- Meeting product specifications
- Protecting valuable catalysts
- Extending cycle lengths to meet changeout and turnaround windows
- Utilisation of challenging feeds

SOLUTION

Shell Catalysts & Technologies' high-capacity nickel, copper–zinc oxide, copper oxide, zinc oxide and silver adsorbents are suitable for single-bed, multi-bed and multilayer configurations, and, when combined with sophisticated models for proper design, provide reliable operation until the scheduled catalyst changeout.

VALUE DELIVERED

Consistently meeting catalyst changeout schedules by selecting the best solution according to the process, the feed and the poisons.

PROOF POINT

Currently in operation in more than 25 commercial operations in both liquid- and gas-phase units.

SUPERIOR ADSORPTION CAPABILITY ENSURES OPTIMISATION OF THE GUARD-BED MASS TRANSFER ZONE.

INTRODUCTION

In a highly competitive environment, meeting product specifications, protecting valuable catalysts, meeting scheduled catalyst changeout windows and monetising challenging feeds are vital targets for the entire refining industry.

CATALYST GUARD BEDS

To ensure catalyst protection, Shell Catalysts and Technologies offers guard beds tailored to the specific requirements of a unit.

Shell Catalysts & Technologies can model specific unit performance by incorporating parameters for the specific catalyst pore structures and the individual kinetics of many poisons, which is essential for a reliable and cost-effective guard-bed design.

The loading design for guard beds include the maximum adsorption capacity in the front zone, the mass transfer zone and the fresh unused material at the exit, as shown in Figure 1.

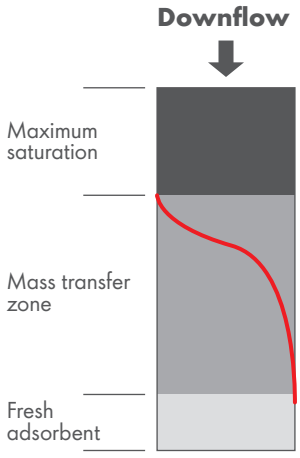

Figure 1: Schematic of guard-bed reactor zones.

Fact sheet

HISTORY OF PROVEN PERFORMANCE

In 1997, through the acquisition of KataLeuna, CRI (now part of Shell Catalysts & Technologies) acquired 40 years of expertise in delivering catalytic and technical solutions. This included extensive knowledge relating to impregnated and precipitated metal oxide compounds, which are useful for a variety of guard-bed and purification applications.

Shell Catalysts & Technologies has further developed and refined the KataLeuna models specifically for sulphur adsorption in various process environments.

KL4202-TL: Carbonyl sulphide and arsine removal

The silver-based adsorbent KL4202-TL is designed to capture carbonyl sulphide, arsine and mercury from cracked gas when located in front or on top of a front-end acetylene hydrogenation catalyst. Since the adsorbent's introduction in 2000, Shell Catalysts & Technologies has gained more than 20 references. KL4202 is also useful for cleaning up olefin-rich offgas streams.

KL6512 series: Organic sulphur removal

The KL6512 series consists of the nickel adsorbents that contain between 35 and 50% nickel per kilogram. Which adsorbent is chosen depends on the nature of the sulphur species present and the requirement for either maximum bulk sulphiding or surface sulphiding. They are used as sulphur guards in liquid and gas phases, and, importantly, are highly effective in removing mercaptan and thiophenic sulphur compounds in both oil refining and petrochemical operations.

KL4213: Multipurpose poisons removal

The KL4213 series mixed copper–zinc oxide is used for removing sulphur from natural gas; arsine, carbonyl sulphide and mercury from propylene streams; arsine and mercury from C_4 cuts and condensates; and light sulphur contaminants from naphtha in a hydrogen-free environment. In the case of mercury guard applications, where there is no hydrogen sulphide in the feed, the adsorbent is supplied in the presulphided form.

KL4215: Mercury removal

The copper oxide KL4215 series consists of highly efficient adsorbents used for mercury removal in the liquid phase. A common application downstream of the steam cracker includes organic mercury removal from C_4 cuts. Other applications include mercury removal from condensates and natural gas when hydrogen sulphide is present in the feed. If the feed is free from hydrogen sulphide, the KL4215 series is supplied in its presulphided form.

KL4019: Hydrogen sulphide removal

The KL4019 series consists of zinc oxide adsorbents used for hydrogen sulphide removal from gas or liquid hydrocarbon streams, including natural gas, at elevated temperatures.

TECHNICAL SUPPORT

Shell Catalysts & Technologies, with its global technical support group, is eager to work with its customers and to provide tailored solutions, operational and start-up assistance, routine performance monitoring and additional technical services to help them get the most out of their purification applications.

SAFEGUARDING DOWNSTREAM CATALYSTS IS VITAL FOR MEETING SCHEDULED CHANGEOUT AND MONETISING CHALLENGING FEEDS.

For more information, please visit www.shell.com/ct

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