

Selective Hydrogenation of the Steamcracker

3 days

HYDVAPO-EN-P

Overview

LEVEL

Skilled

PURPOSE

To improve the knowledge of the selective hydrogenation processes of C₂, C₃, C₄ cuts and pyrolysis gasolines (Pygas) for better controlling the operation.

LEARNING OBJECTIVES

Upon completion of the course, the participants will be able to:
justify the importance of these sections,
explain the meaning of the main operating parameters of these processes and the influence of the operating variables.

WAYS AND MEANS

The content of this course can be adapted to the customer's needs. The pedagogy is focused on the units concerned, under cover of a secrecy agreement if necessary.

Case studies handled in groups, based on typical situations of conduct of the sections studied.

Possible contribution of experienced staff reporting his industrial experience of the operation on a daily basis.

LEARNING ASSESSMENT

Quiz.

PREREQUISITES

To fulfill at least one of the following criteria:

to have 1 year of proven professional experience in a steamcracker complex,

or to be in the process of moving to a position linked to operation in an steamcracker complex.

Agenda

SELECTIVE HYDROGENATION OF THE C₂ CUT

1.25 d

Origin, characteristics and valuation of the C₂ cut: origin and physical state of the cut, average composition, specifications of ethylene produced.

Identification of the impurity to be removed. Selection of the implementation of the treatment in relation to the nature of the impurity.

Location and operating principle of the selective hydrogenation section within the steamcracker: arrangement of the reactors, characteristics of the reactions involved in the process.

Nature, properties and mechanism of action of the catalyst: typical composition, activity, selectivity, main steps of the catalytic act, main well-known poisons (carbon monoxide, hydrogen sulfide, green oils...).

Analysis of the operating conditions: simplified process flow diagram (main process control loops, standard operating conditions, available analyzers) - Operating parameters (composition of the feedstock and hydrogen-rich gas, associated flow rates, CO content, molar ratio H₂/acetylene, pressure, start-up temperature and #t of the reactor...) - Performance monitoring (conversion rate, ethylene gain) - Analysis of some schematics of the DCS.

Case studies of adjustment: materialization of the evolution of the process using defined steps according to the variation of operating variables - Possible optimization points.
Possible major incidents, process safety and associated procedures.

SELECTIVE HYDROGENATION OF THE C₃ CUT

0.5 d

Origin, characteristics and valuation of the cut C₃: origin and physical state of the cut, average composition, specifications of the propylene produced.

Identification of the impurities to be removed. Selection of the implementation of the treatment in relation to the nature of the impurities.

Description of the main differences between the selective hydrogenation of the C₂ section and that of the C₃ section: location of the section, reactions involved, catalyst.

Simplified process flow diagram, operating conditions, driving parameters, performance monitoring, digital driving overviews and associated modules.

Case studies on the tuning of the unit: evolution of the process further to the modification of operating variables according to reference adjustments - Possible optimization points.

Possible major incidents, process safety and associated procedures.

SELECTIVE HYDROGENATION OF THE C₄ CUT

0.5 d

Origin, characteristics and valuation of the cut C₄: origin and physical state of the cut, average composition, specifications of the butadiene 1-3 produced.

Identification of the impurities to be removed, associated constraints - Simplified process flow diagram.

The main differences between the selective hydrogenation of the C₄ cut and those of the C₂ and C₃ cuts.

Operating conditions and performances.

Process safety and associated procedures.

TREATMENT OF PYROLYSIS GASOLINES BY HYDROGENATION

0.75 d

Origin, characteristics and valuation of the C₅⁺ cut (Pygas): origin and physical state of the cut, average composition.

Identification of the impurities to be eliminated, associated constraints - Simplified process flow diagram.

Selective hydrogenation 1st stage.

Types of catalysts according to the content and nature of the sulfur compounds of the feedstock.

Operating conditions and performance measurement.

Process safety and associated procedures.

Hydrogenation 2nd stage.

Role of section.

Types of catalysts.

Operating conditions and performance.