Catalytic Reforming for Refining & Petrochemicals

5.00 days  
Overview  
RAF/CAREF-E

AUDIENCE
Engineers, senior operations personnel or technical supervisory staff involved in the operation, optimization or monitoring of hydrogen and aromatics production units.
Engineers from research centers and engineering companies involved in the different aspects of the operation and process control of these processes.

PURPOSE
This course provides a thorough technical understanding of semi-regenerative and continuous regenerative catalytic reforming processes, for refining and petrochemistry.

LEARNING OBJECTIVES
Upon completion of the course, the participants will be able to:
- assess the influence of operating parameters on a unit performance,
- optimize the process to achieve the targeted yield in BTX, from the design to the operation,
- distinguish between the specificities of semi-regenerative and continuously regenerative units, depending on the refining or petrochemistry environment,
- grasp the essence of catalyst regeneration,
- detect potential deficiencies by troubleshooting,
- acquire the best practices for unit start-up, normal operation and shutdown,
- analyze the optimization process options of an aromatic complex.

PREREQUISITE
No prerequisites for this course.

WAYS AND MEANS
Applications, teamwork, case studies and interactive workshops based on typical real situations.

Agenda

THE CATALYTIC REFORMER WITHIN THE REFINERY SCHEME  
0.50 d
Quality specifications of gasolines; reformulated gasoline and future trends.
Octane improving processes, integration within the refining processes.
Needs in hydrogen. Aromatic complex overview, need for benzene, toluene and xylenes.

CATALYTIC REFORMING REACTIONS & CATALYSTS  
1.00 d
Review of the characteristics of all the chemical reactions: thermodynamics and kinetics.
Influence of the operating parameters on the production of aromatics, hydrogen, octane number, and other yields. Consequences for SR and CCR units.
Catalyst properties: role of the acidic and metallic functions, of the support, of the different promotors and their impact on chemical reactions and yields. Water/chlorine balance and management.
Poisons and ageing factors. Activity follow up and cycle length prediction for semi-regenerative units.
Catalyst regeneration. Management of each step for an optimal activity recovery for SR units. Operating parameters for CCR regeneration loops.
OPERATING PARAMETERS OF A CATALYTIC REFORMER
Process flow diagrams and operating parameters of semi-regenerative (SR) and Continuous Catalyst Regeneration (CCR) units. Main control loops. Typical range of yields.
Operating variables: WABT, WAIT, H₂/HC ratio, flow rates, treat gas characteristics.
Main equipment and metallurgy
Specific features for low pressure equipment. Moving bed technology, recontacting section, catalyst circulation: lifts, #P control, seal legs, nitrogen loops for regeneration, etc.
Analyzers and process control.

OPERATION & OPTIMIZATION FOR CATALYTIC REFORMING
Monitoring the operating variables and optimization, for semi-regenerative and regenerative units.
Operation case studies.
Adjusting to changes in feedstocks origins, N+2A.
High severity of the CCR towards optimized yield in Aromatics. Performance follow-up.
Maximizing the performances of the unit under constraints or limit conditions.
Main steps for start-up and shutdown.

TROUBLESHOOTING FOR CATALYTIC REFORMING
Case studies: main symptoms encountered in operation, diagnosis and remedies.
Specific troubles of CCR units linked to catalyst circulation and regeneration loops.
Catalyst regeneration problems.
ESD, main safety sequences.

THE REFORMER IN THE AROMATIC COMPLEX
Outlets and main uses of BX (Benzene, Xylenes), ethylbenzene.
Basic scheme to upgrade benzene and paraxylene. Aromatic loop.
Operating conditions for a typical arrangement.