Aromatics and Olefins Processes and Production

Course general description:

Aromatics and olefins are fundamental building blocks in the petrochemical industry, serving as precursors for a wide range of products, including plastics, synthetic fibers, resins, solvents, and fuels. This course provides an in-depth exploration of the chemistry, production processes, and operational engineering concepts associated with aromatics (e.g., benzene, toluene, xylenes) and olefins (e.g., ethylene, propylene). Participants will gain insights into the principles, methods, and advancements that drive efficient and sustainable production in these critical sectors..

Audience:

This course is designed for:

1. Process engineers and operators in the petrochemical and refining industries.
2. Chemical engineers and chemists involved in research and development.
3. Plant managers and supervisors seeking to deepen their understanding of aromatics and olefins production.
4. Graduates in chemical, petroleum, or process engineering disciplines.

Course objectives:

1. Understand the chemical properties and industrial importance of aromatics and olefins.
2. Learn the key processes and technologies used in their production.
3. Apply engineering principles to optimize process operations and troubleshoot challenges.
4. Explore advancements in catalysts, reactor design, and sustainability practices.
5. Develop problem-solving skills through real-world case studies and practical exercises.
6. Gain awareness of safety, environmental, and regulatory considerations in aromatics and olefins production.

Course duration:

5 days

Course location:

Dubai

Course contents:

Day 1: Fundamentals of Aromatics and Olefins Chemistry

- Introduction to Aromatics & Olefins – Overview of key chemicals (benzene, toluene, ethylene, propylene) and their industrial applications.
- Feedstock Sources & Cracking Processes – Types of feedstocks and cracking methods for olefin and aromatic production.
- Pretest – Assessing baseline knowledge of participants.
- Group Discussion – Challenges in feedstock selection and cracking efficiency.
- Case Study – Analyzing a steam cracker operation**.**

Day 2: Production Processes for Aromatics

- Catalytic Reforming and Aromatization – Principles, catalysts, and conditions for producing benzene, toluene, and xylene.
- Separation & Purification – Extraction, distillation, and solvent-based processes to optimize purity and yield.
- Practical Exercises – Calculating yields and simulating extraction processes.
- Quiz – Testing understanding of aromatics production processes.
- Tutorial – Hands-on activities to reinforce learning**.**

Day 3: Production Processes for Olefins

- Steam Cracking – Mechanisms, parameters, and byproduct management in ethylene and propylene production.
- Polymerization & Derivatives – Producing polyethylene, polypropylene, and derivatives like ethylene oxide.
- Case Study – Optimizing steam cracker operations for maximum yield.
- Group Discussion – Balancing product slate with market demands.
- Quiz – Evaluating understanding of olefins production**.**

Day 4: Process Optimization, Safety, and Sustainability

- Process Optimization & Energy Efficiency – Control strategies, heat integration, and waste heat recovery for improved yields and reduced energy use.
- Safety & Environmental Considerations – Risk assessment, emissions control, and regulatory compliance.
- Hands-On Simulation – Optimizing a steam cracker using simulation software.
- Group Activity – Developing a sustainability plan for an aromatics plant.
- Discussion – Addressing sustainability and safety in the production processes.

Day 5: Advancements and Final Assessment

- Innovations in Catalysts & Reactor Design – Advances in catalysts, reactor design, and future trends like bio-based feedstocks.
- Career Pathways & Industry Outlook – Opportunities in the aromatics and olefins industry and professional development.
- Final Assessment – Comprehensive written test to measure learning progress.
- Post-Test Comparison – Comparing pretest and post-test results.
- Feedback Session – Discussing key takeaways and answering participant questions.

Methodology:

- 50% lectures & concepts
- 10% Videos
- 15% Case studies
- 15% Exercises & Quizes.
- 10% Discussions

Course code: (TPR0023)