



## HF Alkylation

**Potential PDH:** 16

### Description:

The HF alkylation process is an important part of modern refinery gasoline production. This program, "HF Alkylation Process Technology," has been developed by Refining Process Services to provide an in-depth yet practical review of HF Alkylation Unit Operation. The speakers will cover topics ranging from the basic process principles through items of current interest such as operations troubleshooting and methods of HF detection and leak mitigation. Key process variables such as feedstock quality, reaction conditions, and catalyst composition will be discussed. Various unit configurations by both UOP and Phillips Petroleum licensors will be reviewed and control of the unit to meet product specifications will be taught. A thorough understanding of these principles is required for safe and reliable operation of the HF alkylation unit.

Program participants will have the opportunity to obtain a broad working knowledge of the HF alkylation process including some history of the process and important metallurgy and corrosion aspects. Participants will be invited to submit questions for discussion during the program.

### Outline:

#### Introduction to HF Alkylation

- Basic Reactions
- The Liquid Acid Catalyst
- Basic Process Flow
- Brief History
- Alkylate Value



#### HF Alkylation Process Flow

- Feed Preparation
- Reaction Section
- Product Fractionation
- HF Stripping and Acid Regeneration
- Product Treatment
- Neutralization Systems

#### HF Alkylation Principles of Operation and Chemistry

- Distillation
- HF and Water Stripping



- Adsorption Drying
- Alkylation Reactions
- Defluorination and Neutralization

### Safety and Environmental

- Personal Protective Equipment
- Chemical Hazards
- Waste Management
- Safety Systems

### Process Control

- Feed Drying
- Reactor Parameters Control
- Fractionation
- Acid Regeneration
- Product Treatment

### Operational Objectives

- Minimize Feed Impurities
- Maximize Alkylate Production and Quality
- Minimize Acid Losses
- Produce Specification LPG's

### Equipment Reliability

- Reliability Concerns
- Iron Fluoride Scale
- Corrosion Parameters
- Bimetallic welds
- Effects of Hydrogen

### Emergencies and Mitigation

- Emergency Response
- Detectors and Cameras
- Isolation Valves
- Water Mitigation
- Acid Transfer System

### Troubleshooting

- Equipment Malfunctions
- Reactor Conditions
- Acid Purity

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## Course Content



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- Product Quality
- Corrosion

### Design Guidelines

- Materials of Construction
- Feed Preparation
- Reaction System
- Fractionation System
- Acid Regeneration System

### Who Should Attend:

This program is ideal for personnel involved in refinery unit operations, technical service, process safety, and supervision. Process engineers from design and construction companies as well as those who provide services to the petroleum refining industry should also find this program beneficial.

### Subject Matter Expert (SME):

**Daryl Dunham** is a Senior Consultant with Becht Engineering and resides in Longview Texas. He provides consultation on alkylation operations, refinery troubleshooting, customer training, project support, and technical support for accident investigations. His prior employment was with Conoco, ConocoPhillips, and UOP/Honeywell. He has extensive experience in alkylation troubleshooting, audits on HF Alkylation units, alkylation unit design, and training of alkylation unit operators, engineers, and supervisors. Daryl also served on the staff of ConocoPhillips and UOP Worldwide HF Alkylation Symposia from 2004 to 2016. Daryl holds a BS in Chemical Engineering from Iowa State University.

**Lawrence "Larry" Sault** brings over 40 years of experience in process engineering, development, and operations management, specializing in Alkylation unit performance and safety. As a former Discipline Leader and Alkylation Advisor at BP, he provided global technical support for HF and Sulfuric Acid Alkylation, FCC, and sulfur treatment operations. A key contributor to API RP 751 (HF Alkylation safety), he has served as an industry expert at major conferences, including the DuPont Stratco H<sub>2</sub>SO<sub>4</sub> Alkylation Workshop and the Phillips/UOP HF Alkylation Symposium. Since retiring from BP, Mr. Sault continues to provide consulting and training in Alkylation unit operations, troubleshooting, risk management, and safety. He holds a BS in Chemical Engineering from Purdue University.