EnVision
e-Learning & Universal Simulation

H_2SO_4 Alkylation Unit

A self-paced MultiMedia based Tutorial/CBT and real-time dynamic simulation of a H_2SO_4 Alkylation Unit.

Tutorial/CBT:

This interactive tutorial provides an Overview, Fundamental Principles, and Control and Operating Principles for a H_2SO_4 Alkylation Unit using Voice, Video, Animation and Graphics.

Overview
- Introduction
- Importance of Sulfuric Acid Alkylation Unit
- Key Reactions
- Process Overview

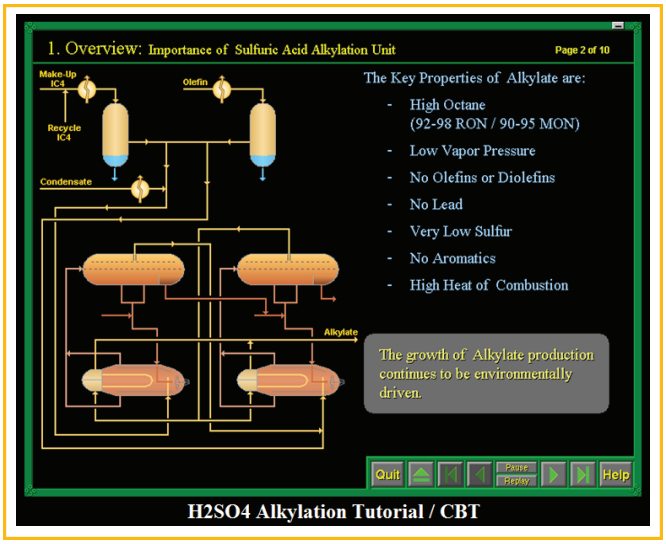
Alkylation Reactions
- Key Chemical Reactions
- Detailed Reactions
- Maximizing Desirable Reactions

Key Controlled and Operating Variables
- Feed Flow Control
- Isobutane to Olefin Ratio
- Reactor Temperature
- Acid Strength
- Olefin Space Velocity
- Reactor Acid Fraction
- Emulsion Recycle
- Mixing of Acid and Hydrocarbon Phases
- Feed Composition
- Alkylate Specifications

H_2SO_4 Alkylation Unit Components
- Feed System
- Alkylation Reactor Section
- Refrigeration Section
- Effluent Treating
- Fractionation Section

Safeguard and Safety System
- Introduction
- Refrigeration Compressor Trip
- Emergency Depressurization System
- Reactor Pair Isolation
- Alkylation Unit Emergency Shutdown

Startup Operations
- Pre-Startup Check
- Deisobutanizer Commissioning
- DIB Feed Treatment
- Section Commissioning



H2SO4 Alkylation Tutorial / CBT

- IC4 Circulation
- Compressor Startup
- Acid Circulation
- Feed Introduction
- Depropanizer Feed Treatment Section Commissioning
- Depropanizer Commissioning

Shutdown Operations
- Olefin Feed Out
- Spent Acid Section Shutdown
- Compressor Shutdown
- Depropanizer Shutdown
- Stop IC4 Circulation
- Shutdown DIB

Troubleshooting
- Loss of Feed
- High Water Content in Acid
- High Acid Consumption
- Low Acid Strength and Acid Runaway
- Acid Carryover from Settler
- Reactor Tube Bundle Leak
- Loss of Cooling Water
- Product Quality

- Tutorial has a built-in Quiz and comes with a Learning Management System (LMS) called TutAdmin. The LMS allows an instructor to register trainees and monitor their performance and Quiz scores
- Tutorial is available as a Standalone or Web based application
- Available in English, Chinese, Danish, Dutch, French, German, Spanish and Swedish

EnVision

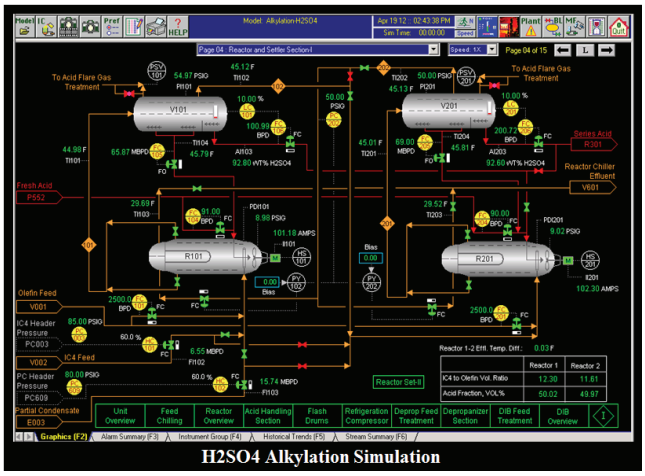
H_2SO_4 Alkylation Unit

Simulation

GSE's EnVision simulation is a real-time dynamic process simulation program used for Operator Training. It is based upon a rigorous and High-Fidelity mathematical process model to provide a realistic dynamic response of a process unit.

The Simulator allows a Trainee to Practice:

- Startup and Shutdown Operations
- Normal Operations
- Emergency Shutdown Operation
- Control Exercises
- Troubleshoot and practice recovery from Equipment, Instrument, and Control Valve Malfunctions



H2SO4 Alkylation Simulation

Major Equipment:

- Feed Coalescers
- Alkylation Reactors (4)
- Acid Settlers (4)
- Final Acid Settler
- Spent Acid Degasser
- Acid Storage
- Flash Drums
- Refrigeration Compressor
- DIB Feed Treatment
- Deisobutanizer (DIB)
- Deprop Feed Treatment
- Depropanizer

Key Operating Variables:

- Olefin Feed: 66 M3/H (10.0 MBPD)
- Make-up Isobutane: 33 M3/H (5.0 MBPD)
- Isobutane Recycle Flow: 53 M3/H (8.0 MBPD)
- Partial Condensate Flow: 210 M3/H (31.5 MBPD)
- Alkylation Reactors (4 numbers):
  - Temperature: 7.0 M3/H (45.0 F)
  - IC4 to Olefin Ratio: 11.6 to 12.3 VOL/VOL
  - Acid Fraction: 50.0 %
  - Acid Strength: 92.8 to 89.5 Wt %
- Flash Drums Pressure: -0.1 BAR (-1.5 PSIG)
- Column Feed Treatment:
  - Caustic Strength: 2.0 Wt %
  - Condensate pH: 9.5
- DIB Feed Flow: 115 M3/H (17.5 MBPD)
- DIB Pressure: 8.3 BAR (120 PSIG)
- N-Butane Product Flow: 15 M3/H (2.3 MBPD)
- Alkylate Product Flow: 68 M3/H (10.3 MBPD)
- Depropanizer Feed Flow: 23 M3/H (3.5 MBPD)
- Depropanizer Pressure: 15 BAR (220 PSIG)
- Propane Product Flow: 220 NM3/H (8.0 MSCFH)

- Simulation comes with a Learning Management System (LMS) called SimAdmin that allows an instructor to register trainees and monitor their performance
- Simulation is available as Standalone (Single or Dual Monitor) and Instructor-Trainee versions

EnVision™ is a trademark of GSE Systems, Inc. All other trademarks are the property of their respective owners. The information in this literature is subject to change without notice and is not to be construed as a warranty.

DS.ENV.39.VB 07/24

GSE SOLUTIONS
Future of Power Operations

info@gses.com | www.gses.com