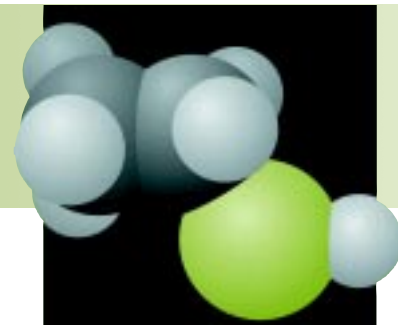


CHEMICALS

Project Fact Sheet



CATALYTIC HYDROGENATION RETROFIT REACTOR

BENEFITS

- Provides electricity savings of 11 percent and natural gas savings of 12 percent per installed unit
- Improves yield
- Decreases operational costs

APPLICATIONS

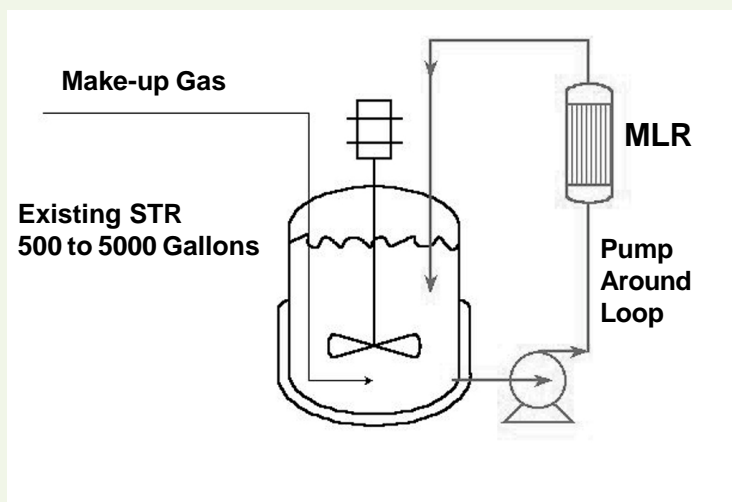
This reactor retrofit will be used in industrial hydrogenation slurry catalyst reaction systems. Sectors of the chemical industry that use hydrogenation reactions include: specialty and fine chemicals, pharmaceuticals, and agricultural intermediates. This technology could also be expanded to other sectors such as fats and oils.

NEW FIXED-BED CATALYST SYSTEM PROVIDES SIGNIFICANT REDUCTION IN ENERGY AND HAZARD EXPOSURE

Hydrogenation is an essential industrial reaction that is often performed using a slurry catalyst system in large stirred-tank reactors. These systems are problematic in several areas, including environmental contamination, waste production, productivity, industrial hygiene, and process safety. This project will develop a new, compact, fixed-bed catalyst system for industrial hydrogenation. The monolith loop reactor (MLR) can be retrofitted to existing stirred-tank hydrogenation reactors. This technology has the potential to save 12 percent in process energy use, to greatly reduce hazardous wastes, and to provide significant cost savings over traditional slurry catalyst reactors.

Current slurry hydrogenation catalysts are pyrophoric and must be handled manually. This creates safety concerns as well as potential hygiene problems. A fixed-bed catalyst system, such as the MLR, would eliminate slurry catalyst handling and filtration, reducing most of the environmental and safety problems. Development of the new MLR system will center on creating a catalyst and catalyst packing system, and on designing, building and testing a pilot-scale facility.

Monolith Loop Reactor (MLR)



The MLR technology can be easily retrofitted to existing plant reactors to replace slurry catalysts. This flexible design can be adapted to a range of hydrogenation processes and chemistries.



Project Description

Goal: Develop a fixed-bed reactor system that can be retrofitted onto an existing slurry phase hydrogenation reactor.

Research for this project is directed along three lines:

- 1) Evaluating and optimizing the reaction dynamics of catalyst on the new fixed-bed substrates
- 2) Evaluating mass transfer and reaction dynamics in new fixed-bed catalyst geometries at the prototype level
- 3) Designing, building, and testing a pilot-scale system

Progress and Milestones

This project includes the following activities:

Laboratory Catalysts and Process Studies

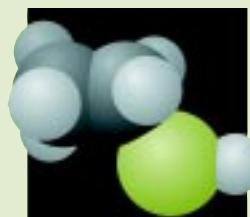
- Conduct catalyst optimization studies
- Conduct catalyst life studies
- Conduct gas/liquid transfer study
- Conduct hydraulic studies for bench reactor
- Conduct liquid mass transfer study

Pilot Demonstration

- Design and construct pilot plant
- Operate pilot plant

Commercialization

Air Products and Chemicals, Inc. will be responsible for commercializing this technology for general use for the hydrogenation of any reactant currently using a slurry catalyst. The pilot reactor developed in this project will be used as a platform to market the technology to the U.S. chemical industry.



PROJECT PARTNERS

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