CHEMICALS

Project Fact Sheet

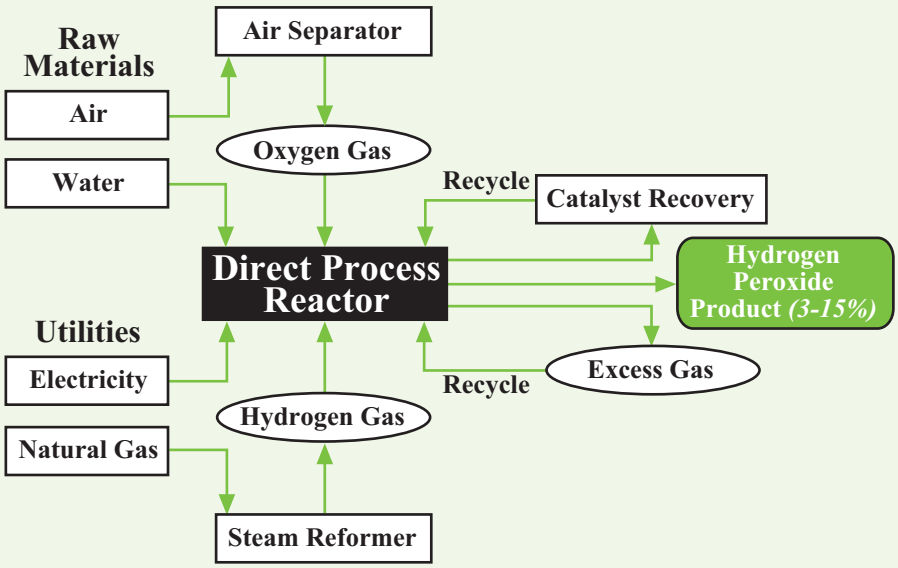
A New Efficient Safe Direct Hydrogen Peroxide Process

This new direct clean process may replace the existing organic solvent-based, indirect process due to its simplicity, reduced energy consumption and lower capital/operating costs

Hydrogen peroxide is an important industrial chemical with a current U.S. market of 1.55 billion pounds annually. A new chemical process has been developed and patented by Princeton Advanced Technology (PAT). This technology is a water-based "direct" reaction between hydrogen and oxygen to produce hydrogen peroxide. This patented direct process uses less energy, generates no appreciable wastes, and has lower capital and operating costs, thus making this technology economically feasible today. These savings are possible due to the simple plant design that eliminates the high cost of solvent distillation and concentration of the product for long distance shipping.

The new direct process utilizes a unique patented flowing regime of small bubbles dispersed in an aqueous media. It has been thoroughly tested and independently verified by a number of industry experts over the past seven years. The concept is based on earlier successful operations in a large petrochemical plant in Texas. The first commercial unit will be built, tested, and evaluated at Chemical Products Corporation in Cartersville, Georgia.

Direct Hydrogen Peroxide Process Schematic



The new direct hydrogen peroxide process being demonstrated by Princeton Advanced Technology will reduce energy consumption and lower capital and operating costs.

Benefits

- Offers annual savings of 0.74 trillion Btu by 2010
- Eliminates the need for steam used for distillation in the production of hydrogen peroxide
- Operates in water rather then an organic solution, thus eliminating the use of hazardous and polluting chemicals
- Has lower capital and operating costs resulting in a significant price advantage over the current manufacturing method

Applications

Will replace the current organic solvent-based indirect method of hydrogen peroxide production. Pulp/paper producers use 65% of the hydrogen peroxide product produced today and will be the primary target market. Given the technical and cost advantages of this new process, future markets for its hydrogen peroxide include use as an oxidant to produce petrochemicals, water and wastewater treatment, and toxic waste site remediation.

Project Partners

NICE^3 Program
Washington, DC

Georgia Department of Natural Resources
Atlanta, GA

Chemical Products Corporation
Cartersville, GA

Princeton Advanced Technology
Hilton Head, SC

Project Description

Goal: To design and build a direct hydrogen peroxide commercial demonstration unit to:

- Confirm the design, operation and economic parameters of the process.
- Demonstrate that the unit can make hydrogen peroxide in a safe and efficient manner.
- Optimize the process chemistry and catalyst performance for use in commercial operations.
- Collect data to confirm and optimize process equipment performance and reliablity.
- Operate the unit in such a manner as to collect all necessary data to permit the engineering/design/construction of mutiple commercial production facilities.

Progress and Milestones

The following are the main tasks to be performed:

- Design, specify, procure and build a demonstration unit at Chemical Products Corporation in Cartersville, Georgia.
- Operate the demonstration unit at low hydrogen concentrations to confirm process chemistry, catalyst, and equipment performance parameters.
- Once process performance parameters have been optimized, operate the demonstration unit at higher hydrogen concentration to optimize commercial performance.

Economics and Commercial Potential

Hydrogen peroxide is a fast growing, high volume industrial chemical with an expected growth rate of 6% to 10% annually. Given the lower capital and operating costs of the new direct hydrogen peroxide process compared to the existing indirect method, there is a significant cost advantage for this new process. This cost advantage will be a major driving factor for the commercial acceptance of this new process. With the engineering and operational data gained from this funded demonstration plant, sufficient data will be collected to begin commercial use of this technology by 2005. Annual energy savings by 2010 would be 0.74 trillion Btu from 6 units installed. By 2020 the savings would grow to 15.8 trillion Btu with 116 commercial production units in service.

NICE^3 – National Industrial Competitiveness through Energy, Environment, and Economics:
An innovative, cost-sharing program to promote energy efficiency, clean production, and economic competitiveness in industry.
This grant program provides funding to state and industry partnerships for projects that demonstrate advances in energy efficiency and clean production technologies. Awardees receive a one-time grant of up to $525,000. Grants fund up to 50% of total project cost for up to 3 years.

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