Environmentally Friendly Propylene Epoxidation Process Using Silver Catalysts

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Introduction
Propylene oxide (PO) is one of the most important and wildly used chemicals which have more than 6 million tons per year production worldwide. The methods for producing propylene oxide such as the chlorohydrins process, the hydroperoxide process and hydrogen peroxide to oxidize propylene have disadvantages among the environmental impacts and the cost of production. An environmentally friendly propylene epoxidation process is developed by using molecular oxygen as the oxidant and silver catalysts to reach higher selectivity of PO.

Silver nanoparticles are the industrial catalyst for the production of ethylene oxide from ethylene. The feasibility of using 8% weight percent silver catalysts to catalyze propylene epoxidation is investigated in this work.

Methods

Tubular reactor heated by a tube furnace
GC with both FID and TCD detectors

Flow diagram of the catalyst testing system

Future Work
The organic products need to be specified and quantified. Other nano-catalysts for the direct gas-phase propylene epoxidation reaction can also be studied to achieve high conversion of reactants as well as high selectivity of PO.

Conclusions
- Catalyst performance strongly depends on the reaction temperature.
- The selectivity of organic products increased with increasing reaction temperature.
- Higher reaction temperature favors CO2 formation.

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