



Technology 357: Process for Nitrobenzene

Summary

The innovation is a novel catalytic chemical process for the manufacture of nitrobenzene by vapor phase nitration of benzene with dilute nitric acid using a solid acid catalyst. It represents a green chemistry technology and should be commercially viable as well. In this process, benzene is nitrated using dilute nitric acid over solid acid catalyst in the vapor phase. Nitrobenzene is formed in high yields and no byproducts such as sulfuric acid are formed in the reaction. Using a solid acid catalyst packed in a tubular reactor, the hazards of handling and having an inventory of sulfuric acid would be totally avoided. The capital cost for the plant based on this technology should be lower by 30-40% compared to the conventional process. Specific benefits include:

- The raw material requirement has been drastically reduced. The material index on main raw material kinds is reduced up to 1.2 kg per liter compared to 1.9 kg in the working production at a total exclusion of 500 kg of sulfuric acid per ton of nitrobenzene.
- The number of technological stages is also reduced from sixteen to twelve stages. It is believed it will have at least 10% reduction in production costs.
- The concentration stage involving sulfuric acid waste, which is a power intensive step in the production process, is eliminated which decreases the power requirement by 30-40%.
- No sulfuric acid handling and disposal hazards.
- With this innovation, the catalyst is solid so catalyst separation from the reaction product is not required.

Value Proposition

Since there is no use of sulphuric acid, it is an environmentally benign process. It is a commercially feasible new green process.

Development Status

The inventor has achieved a lab-scale prototype. It has been tested in industry also and has been accepted for product specifications. It should be completely developed in seven to twelve months.

IP Status

Patent protection has been obtained in India, the United States and Europe. The name of the patent is: Process for vapor phase nitration of benzene using nitric acid over molybdenum silica catalyst. Indian patent. Patent Number: 798/DEL/2002. In the United States, Patent Name: Process for vapor phase nitration of benzene using nitric acid over molybdenum silica catalyst. Patent Number 6,791,000

Partner Opportunities

The single largest potential customer in the United States would be DuPont. Its facilities produce approximately 80% of all the aniline production in the country. DuPont has its own licensed process and its process is viewed as an industry leader. Bayer also has its own licensed process.

Innovator

Dr. Mohan Dongare, National Chemical Laboratory

For more information, please contact Earle Hager, IC² Institute, Global Commercialization Group at 512-475-7789 (office), 512-431-3940 (mobile) or ehager@ic2.utexas.edu.



Global Commercialization Group

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