



TECHNOLOGY

Production of Isocyanates from Dinitrogen and Carbon Dioxide

OVERVIEW

Background

The conversion of dinitrogen (N_2) into ammonia (NH_3) is an important chemical process both in living tissue (formation of amino acids and nucleotides) and industrial applications. However, current industrial methods for the production of ammonia is an energy-intensive process that is poorly understood. One industrial use for industrial amines is the production of isocyanates. Isocyanates are important chemical precursors for the production of subsequent amines and as building blocks for the manufacture of polyurethanes. The production of isocyanates is a difficult process that involves reacting a primary amine with the poisonous gas phosgene. While large quantities of both ammonia and isocyanates are produced every year, there is room for improvement in the manufacturing process for both these nitrogen containing compounds.

Innovative Technology

Researchers at the University of Maryland have developed a chemical cycle that allows for the energy-efficient conversion of dinitrogen and carbon dioxide directly into isocyanates. This direct production of isocyanates eliminates the need to use phosgene and avoids the high energy needed to produce ammonia from dinitrogen.

APPLICATIONS

- Production of Isocyanates
- Polyurethane manufacture
- Production of other amines

ADVANTAGES

- Direct synthesis of isocyanates without phosgene
- Lower energy production of amines
- Uses simple and abundant precursors (N_2 and CO_2)

CONTACT INFO

UM Ventures
0134 Lee Building
7809 Regents Drive
College Park, MD 20742
Email: umdtechtransfer@umd.edu
Phone: (301) 405-3947 | Fax: (301) 314-9502

Additional Information

INSTITUTION

University of Maryland, College Park

PATENT STATUS

Pending

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CATEGORIES

- Chemical
- Materials

EXTERNAL RESOURCES

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