

Synthesis of Nitrogen or Phosphorous Containing Compounds

A modified Fischer-Tropsch process to produce valuable nitrogen containing products of varying chain length

Published: 26th January 2018



Please note, header image is purely illustrative. Source: sirdle, Flickr, CC BY-SA 2.0

Background

Amines and nitriles are important base chemicals and they are typically produced from oxygenate precursors which themselves are derived from olefins. This process developed by UCT researchers eliminates the use of two steps.

Technology Overview

In this modified Fischer-Tropsch process valuable nitrogen containing products of varying chain length are produced via co-feeding of suitable gases such as ammonia. These nitrogen-containing products include amines, nitriles, amides and formamides.

A process for the production of nitrogen containing compounds from synthesis gas during the hydrogenation of carbon monoxide and or carbon dioxide components in the synthesis gas in a catalytic operated reactor at between 160°C and 400°C and a pressure of between 1 bar and 50 bar, through cofeeding a nitrogen containing gas to the reactor together with the synthesis gas. The heterogeneous catalyst and the process conditions are selected to favour the production of nitrogen containing compounds.

Benefits

- Can be incorporated in existing Fischer-Tropsch plants/units without catalyst modification (iron based catalysts are best suited)
- Allows flexible operation of Fischer-Tropsch plants/ units in either 'fuels' or 'chemicals' mode
- Suppression of oxygenate formation including carboxylic acids
- Possibility to selectively convert oxygenates including glycerine to valuable nitrogen containing compounds
- Can be tailored to respond quickly to changing market conditions ('demand driven production')

Applications

An ideal commercial partner to use this modified process will be a company involved in the feed-to-liquid (XTL) business with a focus on chemical production, or a company that is already in the XTL business, but with an interest in making use of the potential of the Fischer-Tropsch synthesis to produce highly valuable nitrogen containing compounds. It is also useful to those who want to selectively convert oxygenates including glycerine to nitrogen containing products.

Further Details

Technology Readiness Level 5 - Validated in a lab environment

Patents

- China: 200980113744.1
- Europe: 09733651.5
- GCC: 13302/2009
- South Africa: 2010/07629
- United States: 12/988,052

IP Status

- Patented

Seeking

- Development partner
- Commercial partner
- Licensing