



TECH 2021-3: Nitrobenzene/Aniline/MDI

Nitrobenzene/Aniline/MDI is one in a series of reports published as part of NexantECA's 2021 Technoeconomics – Energy & Chemicals (TECH) program.

Overview

Methylene diphenyl diisocyanate (MDI, CAS number: 101-68-8) is a critical intermediate in the manufacture of polyurethane insulation foam in the construction and appliance industry as well as more specialist uses in the textile and CASE industries. Demand is expected to increase as insulation is seen as a key route to meeting climate change targets through reducing household and commercial building energy consumption.

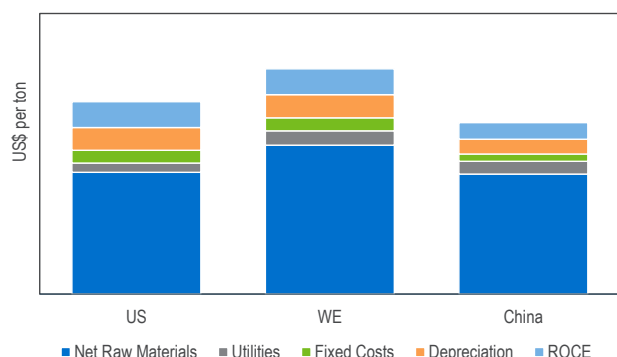
MDI is a collective name for different chemicals which have a similar chemical structure. As well as the monomeric 4,4-MDI form, there are two other isomers – 2,2-MDI and 2,4-MDI – and oligomeric versions in which several monomers are joined together with isocyanate groups at either end. Polymeric MDI (PMDI) and High Functional Polymeric MDI (HFPMDI) are the most common grades of MDI and are used primarily in the production of polyurethane insulation foam.

This report provides an overview of technological, economic and market aspects of the MDI industry. The following issues are addressed in the report:

- What are the technologies used to produce MDI, aniline and nitrobenzene? And what other auxiliary technologies are required?
- How much does it cost to produce MDI and what are the costs to produce its precursors?
- What are the key end-uses and market drivers for MDI currently?

Cost of Polymeric MDI Production by Geography

Capacity – 400 ktpa, 2021-Q1



Commercial Technologies

NexantECA has analyzed the process technologies required to produce MDI, aniline, nitrobenzene and auxiliary chemicals. As well as process descriptions, commentary around the availability of technologies to license by third parties has been made.

Process Economics

The economic analysis provides an overview of production costs for MDI as well as nitrobenzene and aniline in Western Europe, the United States and China in 1Q 2021. An overview of the sustainability of the MDI value chain is presented, including an analysis of the impacts of carbon taxation and decarbonization on costs.

Commercial Overview

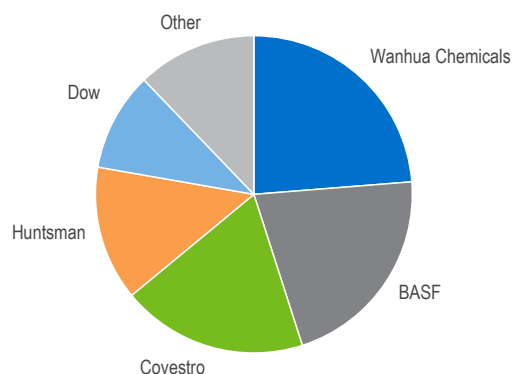
MDI is used almost exclusively to produce polyurethanes. Polymeric grades of MDI are primarily used in semi-rigid and rigid foams while monomeric grades are used primarily in the CASE industry in more specialist applications.

The construction and appliance sectors are the major end-use sectors for MDI and the strongest drivers of global demand growth for MDI. Both the construction and appliance sector are dominated by rigid foams, which makes up the largest application area of MDI.

The market for MDI is analyzed on a global and regional basis with commentary made around the key market drivers historically and over the medium-term forecast.

Global Polymeric MDI Capacity by Marketer

9.4 million tons per year, 2021





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Technology and Costs comprises the Technoeconomics – Energy & Chemicals (TECH) program, the Biorenewable Insights program (BI), and the new Cost Curve Analysis. These programs provide comparative economics of different process routes and technologies in various geographic regions.

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