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C3Or4A-05: New design data for ortho-parahydrogen converters

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The increased demand for hydrogen as an energy vector and storage medium drives the need for higher liquefaction capacities. However, the design of the necessary ortho-parahydrogen converters has long been associated with substantial uncertainty. Until now, the only available data on the activity of the standard catalyst, hydrous ferric oxide—commercially available as the “Ionex-Type O-P Catalyst”(Ionex) from Molecular Products—were both outdated and contradictory.

At Dresden University of Technology, the HyCat project was conducted to overcome this long-standing issue by establishing a new, highly accurate set of design data. Building on previously presented efforts, the final results for Ionex’s conversion activity are now available across an extensive range of temperatures and pressures, addressing both ortho-para and para-ortho conversion directions. The collected data have been employed to parameterize kinetic models, resulting in an improved prediction accuracy of ortho-para conversion processes. This work summarizes the kinetic measurements and modeling endeavors, facilitating the design and optimization of hydrogen liquefaction plants.

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