July 24, 2025

New Option for Hydrogenation: Palladium Catalyst "CHOIS-5D" Enables Efficient, Low-Pd Loading Hydrogenation Under Sulfur-Rich Conditions

～Demonstrates High Activity in the Hydrogenation of Sulfur-Containing Nitro Compounds
— Toward Applications in Pharmaceuticals and Advanced Materials～

At the summer symposium 2025 of the Japanese Society for Process Chemistry held on July 24, 2025, N.E. CHEMCAT CORPORATION (Head office: Minato-ku, TOKYO, President: Susumu Endo) announced that the catalyst "CHOIS-5D" exhibits high activity for sulfur-containing compounds, which are considered to be particularly difficult among the hydrogenation reactions of nitro compounds.

CHOIS-5D was originally launched in 2024 as a product that exhibits high hydrogenation activity in the debenzylation reaction while reducing the palladium content to 5 wt%. Recently, we have demonstrated high activity of CHOIS-5D in the hydrogenation reaction of nitro compounds with sulfur-containing groups like sulfide, sulfonyl groups, thiophene rings, and other groups that have strong poisoning effect.

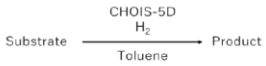
As a result, CHOIS-5D provides a new valuable solution for hydrogenation of sulfur-containing nitro compounds, which has been considered difficult with conventional palladium catalyst products, taking into account both performance and economic aspects.

【Overview】

Precious metal catalyzed hydrogenation reactions are widely used in the synthesis of pharmaceutical intermediates and monomers for high-performance polymer materials because they enable various functional group transformations under mild reaction conditions. However, precious metal catalysts do not retain sufficient activity due to their strong interaction with sulfur compounds (catalyst poisoning), and therefore, the conversion of various functional groups in the presence of sulfur requires the use of large amounts of catalysts with high palladium content, which poses performance and cost challenges.

Last year, we developed and launched "CHOIS-5D"- a palladium-on-carbon catalyst for debenzylation reaction, in which the loading amount of Palladium was reduced from 10wt% to 5wt%.

In response to growing market needs for catalysts that can operate under highly poisoning conditions, we investigated hydrogenation reactions of several sulfur-containing nitro compounds with sulfides, sulfonyl groups, thiophene rings, etc., and found that the target amino compounds were obtained with high efficiency using this product (Table 1). Based on these results, "CHOIS-5D" has superior catalytic performance compared to conventional palladium catalysts in the hydrogenation of various sulfur-containing nitro compounds as well as in the debenzylation reaction. This product enables us to offer a synthesis route with significantly lower catalyst costs.



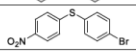
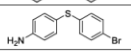
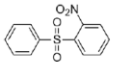
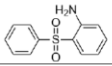
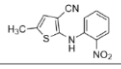
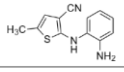
Entry	Substrate	Product	Cat., Temp., Time, H2	Conv.	Select.
1			2.5 mol%, 70 ℃, 4 h., 0.4 MPa	>98%	>98%
2			2.5 mol%, 30 ℃, 4 h., 0.5 MPa	98%	96%
3			2.5 mol%, 70 ℃, 1h., 0.1 MPa	96%	>98%
4			5.0 mol%, 70 ℃, 4 h., 0.4 MPa	>98%	95%

Table 1: Catalytic hydrogenation reactions for sulfur-containing nitro compounds

This product contributes to both the production efficiency and cost effectiveness required in the synthesis of pharmaceutical intermediates, the production of monomers for highly functional polymer materials, and the manufacture of amino compounds for electronic materials and dyes.

■ About N.E. CHEMCAT CORPORATION:

N.E. CHEMCAT CORPORATION is engaged in the development, manufacturing, and distribution of chemical catalysts, auto exhaust catalysts (including three-way catalysts and diesel auto catalysts), and fuel cell catalysts, and recovery of precious metal catalysts.

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[Foundation] April 1964 [Capital] 3.4235 billion yen

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