

## Catalytic activity of composites of nickel boride nanoparticles and anodic nanoporous alumina in hydrogenation reactions



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Hydrogenation is an important process for organic synthesis leading to valuable chemicals for pharmaceutics and agrochemistry.

**Ni-based nanoparticles (NPs)** are promising substitutes for Pd catalysts typically employed for such reactions.

**Immobilization** of NPs on a porous support improves their separation from the reaction mixture, mitigates their aggregation *etc.* 

**Anodic nanoporous alumina (AAO)** is attractive as the support, as it:

- has high specific surface area available for distribution of the NPs;
- constitutes a whole entity, allowing to avoid extra steps of separation of the catalysts from the products.



Can be catalytically hydrogenated by H<sub>2</sub> at 1 atm (2 possible groups)

The work aimed at assessment of the catalytic activity of Ni boride NPs immobilized on anodic nanoporous alumina (AAO) in hydrogenation of heteroaromatic compounds on an example of a substituted imidazo-[1,5-a]-pyridine S.





## Conclusions

- The possibility to perform hydrogenation of heterocycles on the Ni-B/AAO/AI composites was shown.
- > The product of hydrogenation of both possible groups of S was selectively obtained on the Ni-B/AAO/AI catalysts with both  $H_2$  and NaBH<sub>4</sub> as the hydrogen sources, while the mixture of

products was formed on Pd/C (the product of the hydrogenation of the aromatic ring only was the dominating one).

The conditions for *ca.* 100% conversion of the substituted imidazo-[1,5-*a*]-pyridine S on Ni-B/AAO/AI by NaBH<sub>4</sub> were found, while the conversion on the Ni-B particles without the support were significantly lower.

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