Back

Advertise

ChemCatChem
The European Society Journal for Catalysis
Chemistry Europe
European Chemical Societies Publishing

RESEARCH ARTICLE

Pulse Catalytic Isopropanol Dehydration to Propylene Over Natural Acidic Clays: Comparison With Zeolite and Amorphous Silica-Alumina

Tien Hoang Nguyen, Jean-Luc Dubois, Aline Auroux, Georgeta Postole

First published: 21 February 2026
https://doi.org/10.1002/cctc.202600015

VIEW METRICS

Get access to the full version of this article. View access options below.

Institutional Login

Access through your institution

Log in to Wiley Online Library

If you have previously obtained access with your personal account, please log in.

Log in with CONNECT

One account for all your research.

Wiley Online Library is part of the CONNECT Network.

Back

48-Hour online access $16.00
Details

Online-only access $27.00
Details

PDF download and online access $62.00
Details

Check out

ABSTRACT

The potential of saponite clays, hydrous magnesium silicates with low content of aluminium, is investigated in the selective isopropanol catalytic dehydration to propylene. Their performances are compared with the activity of montmorillonite clays, low-alumina zeolite and amorphous silica–aluminas. All solids were characterized by XRD, N_2 sorption isotherms, TGA-IR, NH_3 adsorption FTIR, NH_3/SO_2 adsorption microcalorimetry, and solid-state ^{1}H and ^{27}Al NMR. The physico-chemical analyses show that the samples are predominantly mesoporous, except zeolite, with BET surface areas ranging from 130 to 430 m^2/g. All catalysts display acidic character and are thermally stable below 300°C. Their catalytic performances were evaluated by using a pulse catalytic reactor set inside a calorimeter (DSC-GC). This technique offers a convenient way to screen industrially relevant temperature regimes that balance activity, selectivity and process economy of different type of solids. Catalytic testing revealed that below 150°C, clays outperformed amorphous silica-aluminas, whereas the zeolite, although giving high conversion, is not suitable for the application due to a low selectivity to propylene (10%). An optimized activation temperature is the key parameter allowing clays to preserve structural stability, moderate surface area with favorable pore structure and to maintain a suitable number of acid sites.

Conflicts of Interest

The authors declare no conflict of interest.

Back

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Supporting Information

Filename	Description
cctc70617-sup-0001-SuppMat.pdf 1.4 MB	**Supporting File**: cctc70617-sup-0001-SuppMat.pdf.

Please note: The publisher is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing content) should be directed to the corresponding author for the article.

References

1 G. Postole, S. Segondy, T. Cabanis, T.-H. Nguyen, A. Auroux, and J.-L. Dubois, "Relationship between Number and Strength of Acid–Base Catalytic Sites and Their Performances in Isopropanol Dehydration Reaction," *Catalysts* **15** (2025): 768, https://doi.org/10.3390/catal15080768.

CAS | Web of Science® | Google Scholar

2 J.-L. Dubois, G. Postole, L. Silvester, and A. Auroux, "Catalytic Dehydration of Isopropanol to Propylene," *Catalysts* **12** (2022): 1097, https://doi.org/10.3390/catal12101097.

CAS | Web of Science® | Google Scholar

3 H. Fukuhara, F. Matsunaga, M. Yasuhara, S. Araki, and T. H. Isaka, EP0379803 (1989), European Patent, https://worldwide.espacenet.com/patent/search/family/026547935/publication/EP0379803A1?q=EP0379803.

Google Scholar

4 N. Aribert, L. Brandhorst, V. Coupard, S. Maury, and T. Vivien, EP3074369 (2014), European Patent, https://worldwide.espacenet.com/patent/search/family/049998514/publication/EP3074369A1?q=EP3074369.