Electronic Supplementary Material (ESI) for Catalysis Science & Technology.

Supplementary Information

Nano-sized H-ZSM-5 Zeolite Catalyzes Aldol Condensation Reaction to Prepare Methyl Acrylate and Acrylic Acid

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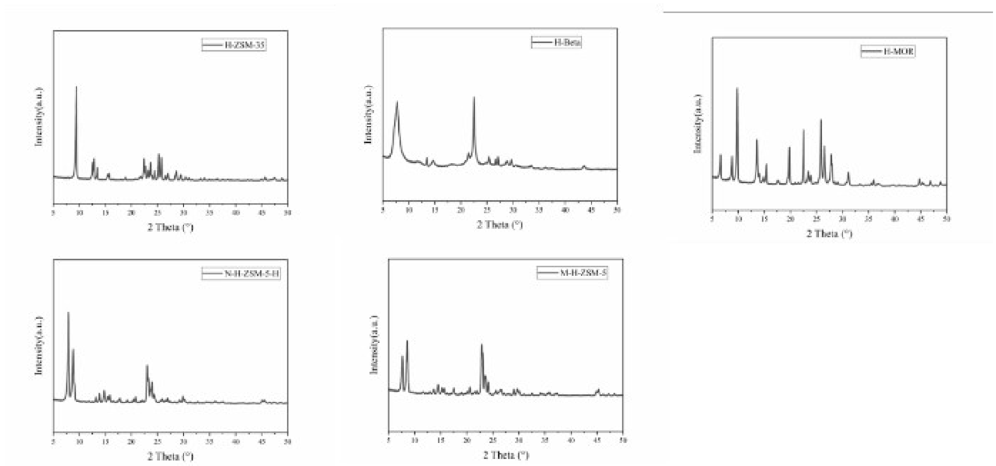


Zeolites	N-H-ZSM-5	H-ZSM-35	H-Beta	H-MOR	N-H-ZSM-5-H	M-H-ZSM-5
SiO_2/Al_2O_3	40.8	37.5	36.6	28.7	221.1	36.5

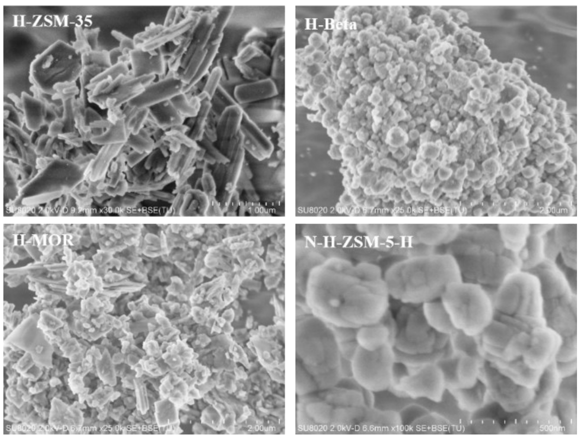


Figure. S1 XRD Characterization, XRF characterization and SEM of zeolites used in this study.

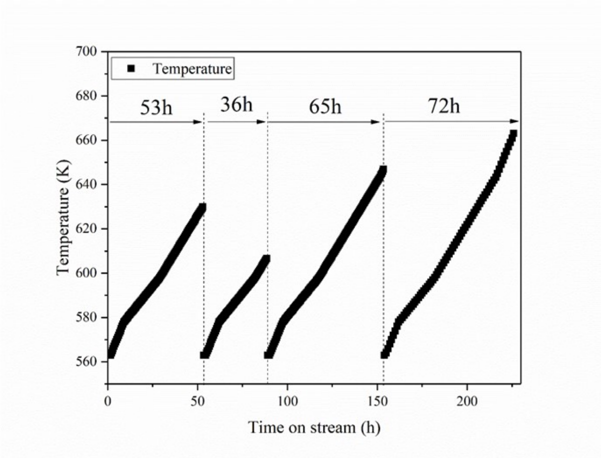


Figure. S2 The programmed temperature in the stability test for aldol condensation reaction over fresh and regenerated N-H-ZSM-5.

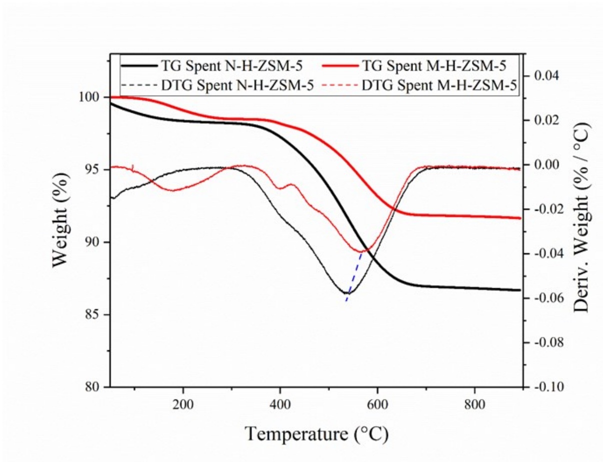


Figure. S3 TGA analysis of the spent catalysts.

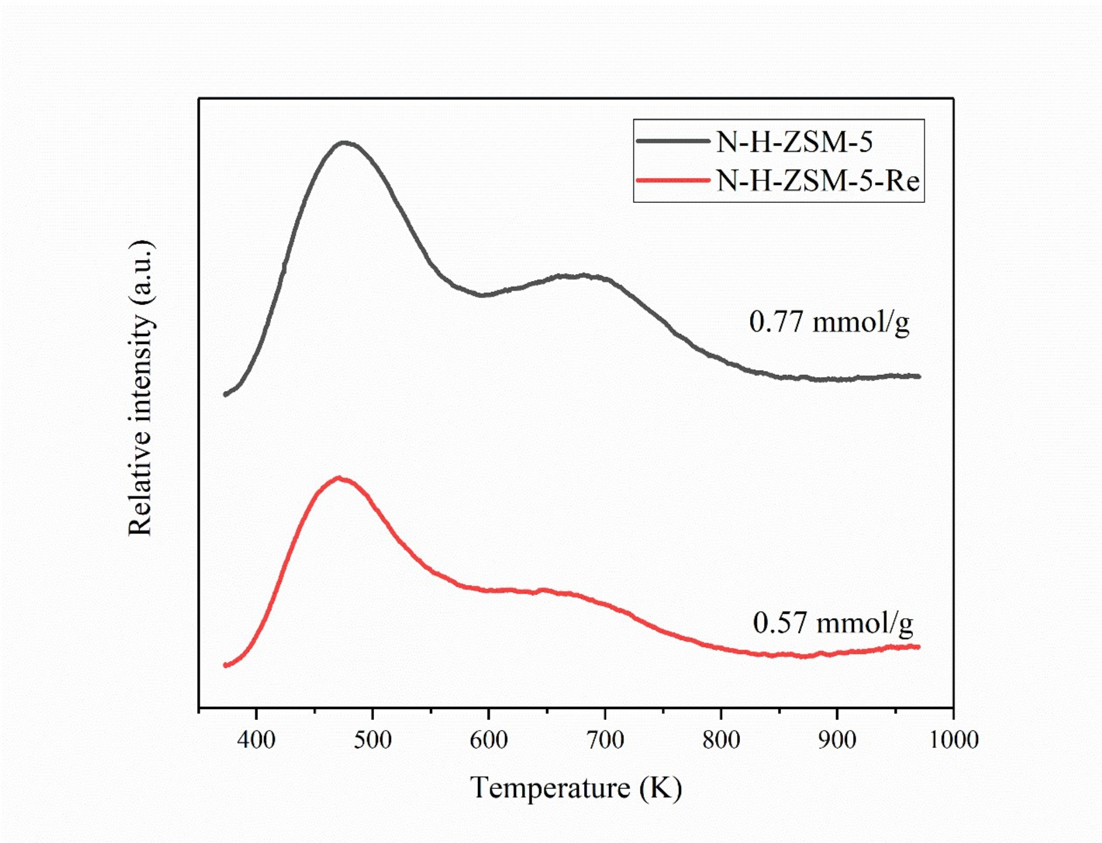


Figure. S4 NH_3-TPD for N-H-ZSM-5 zeolite catalysts.

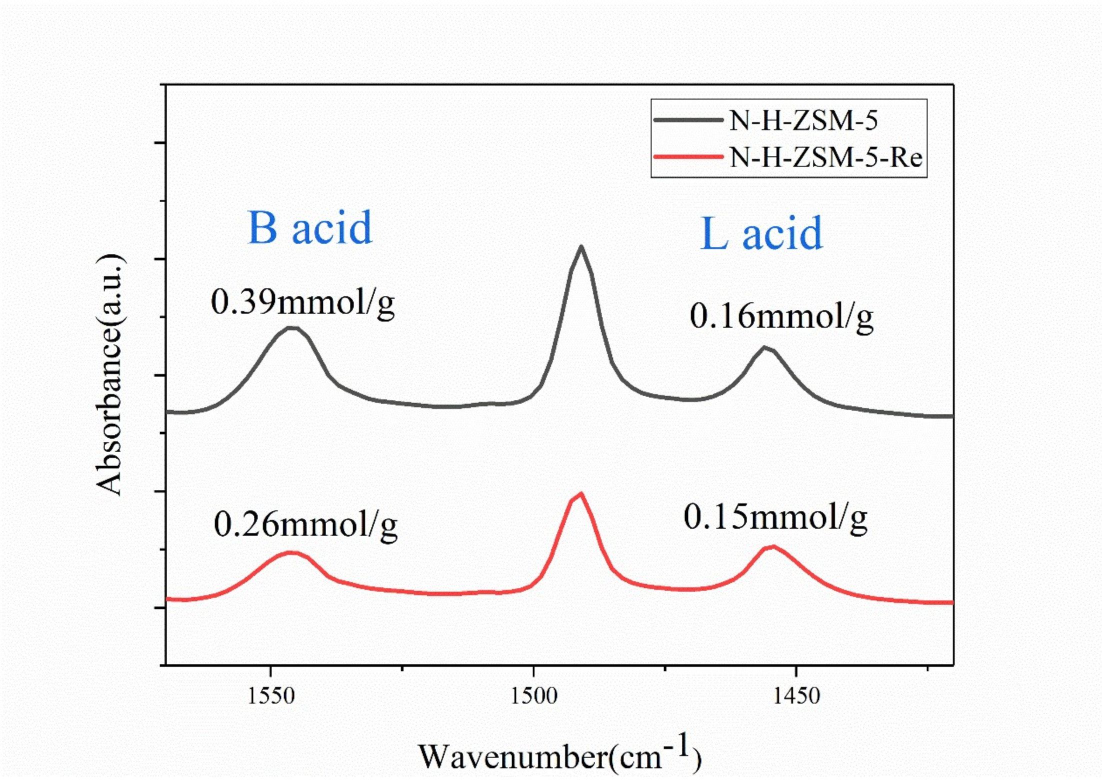
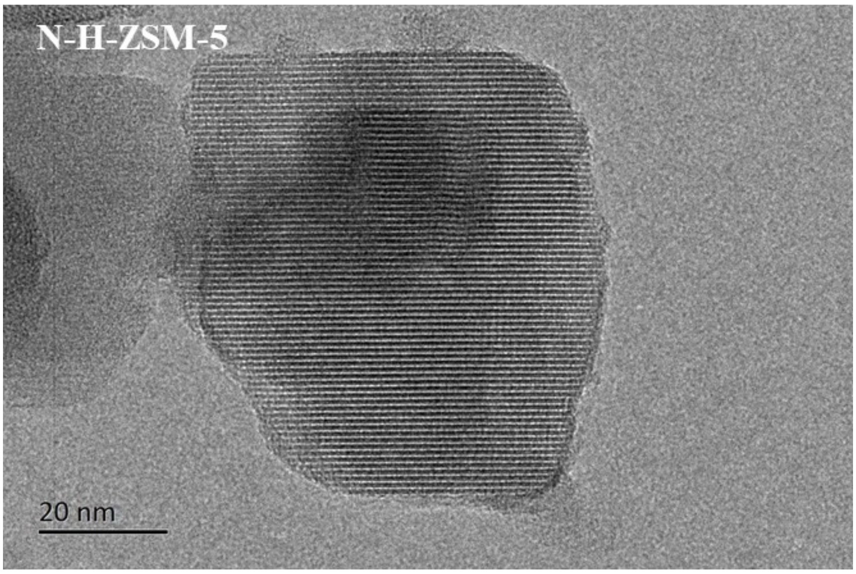


Figure. S5 Py-FTIR for N-H-ZSM-5 zeolite catalysts.



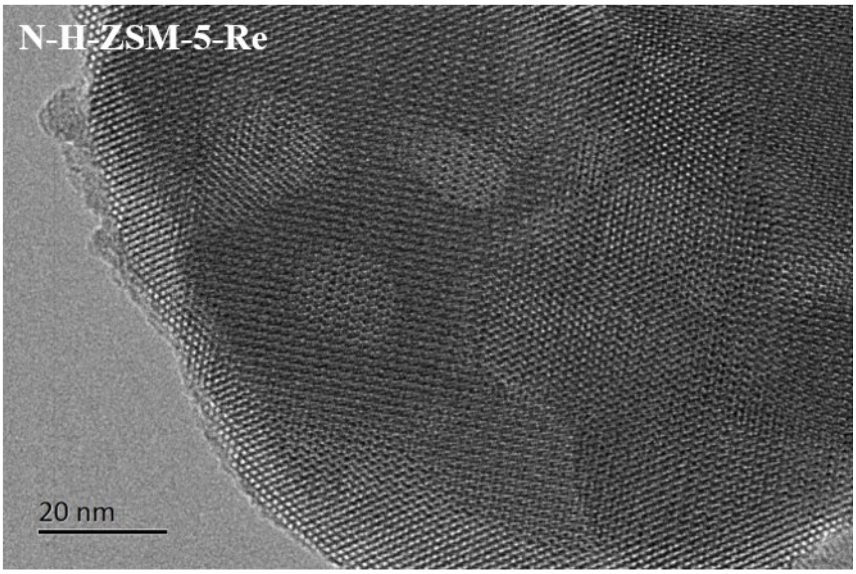


Figure. S6 TEM image for N-H-ZSM-5 zeolite catalysts.

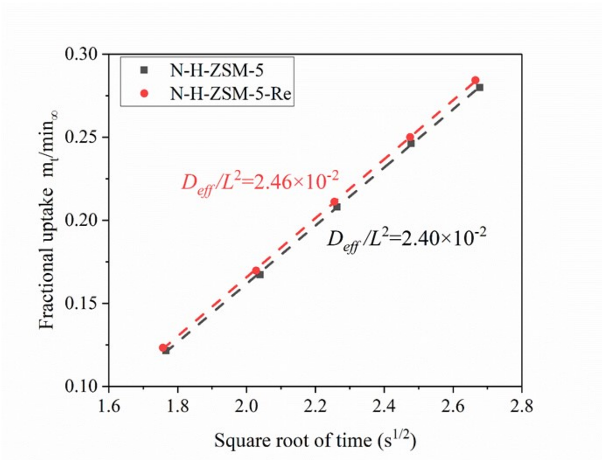


Figure. S7 Initial uptake rate of MAc in catalyst measured by IGA (313K, 5mbar).

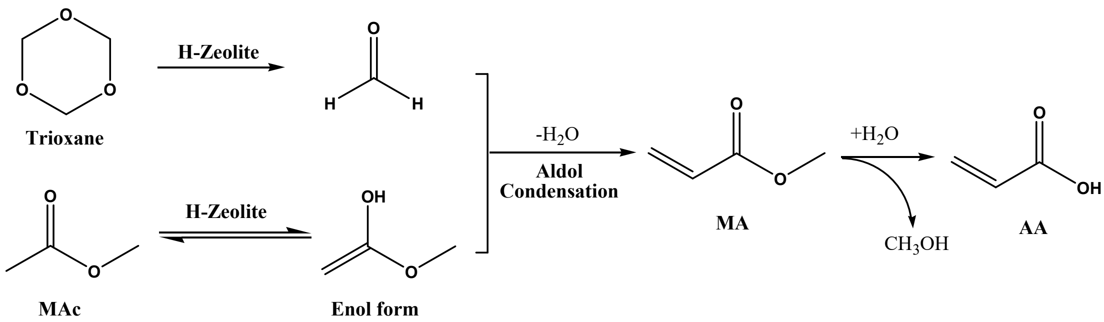


Figure. S8 Reaction pathways of MAc and tioxane in H-type zeolite.

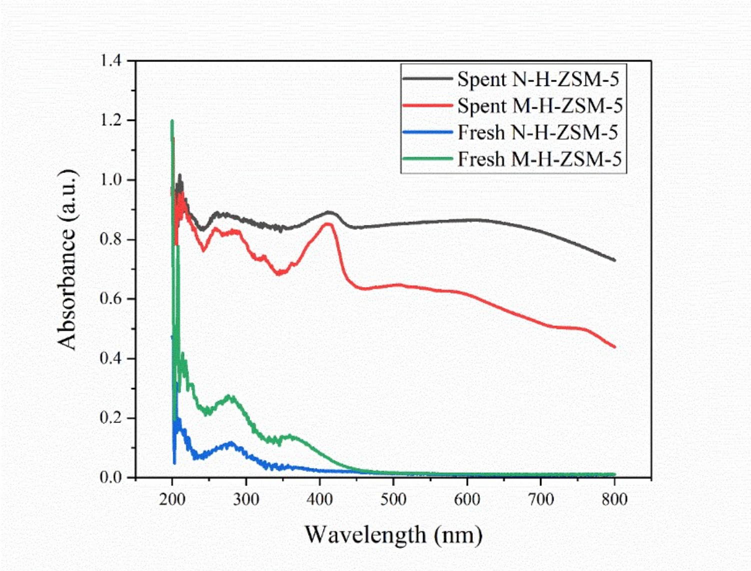


Figure S9 UV-Vis of the fresh and spent catalysts.

The fresh catalyst and the spent catalyst were analysed by UV-Vis. It is obvious that the fresh catalyst has no peaks above 450 nm. Compared with the spent M-H-ZSM-5, the spent N-H-ZSM-5 has a large broad peak at 620 nm, which is usually attributed to polyaromatic hydrocarbons[1-2].

Supplementary References:

1. V. Van Speybroeck, K. Hemelsoet, K. De Wispelaere, Q. Qian, J. Van der Mynsbrugge, B. De Sterck, B. M. Weckhuysen and M. Waroquier, *ChemCatChem*, 2013, **5**, 173-184.

2. E. Borodina, F. Meirer, I. Lezcano-Gonzalez, M. Mokhtar, A. M. Asiri, S. A. Al-Thabaiti, S. N. Basahel, J. Ruiz-Martinez and B. M. Weckhuysen, *ACS Catal.*, 2015, **5**, 992-1003.