Supplementary Material

Article: Dehydration of fructose to 5-hydroxymethylfurfural: effects of acidity and porosity of different catalysts in the conversion, selectivity, and yield

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Additional Experimental Data

1. Quantification of Fructose and HMF by HPLC

The formation of HMF was confirmed since the reaction sample chromatograms showed signals for both RID (refractive index detector) and DAD (diode-array detector) at the same retention times were observed when standard HMF solutions were injected. In addition, the absorption pattern obtained was the same for reaction rates and HMF solutions, as can be seen in the contour maps present in the article. To quantify the fructose consumed and formed HMF, analytical curves produced from the injection of standard solutions were used, integrating the corresponding peak to the substance observed in the RID. Both curves had a linear behavior with a correlation coefficient (R^2) greater than or equal to 0.999.

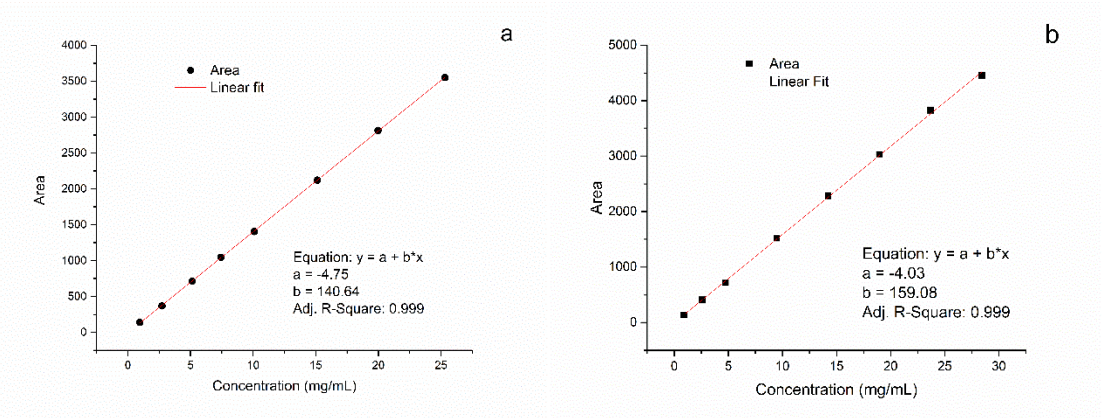

Fig. S1: Analytical curves of fructose (a) and HMF (b).

2. Characterization of Catalysts

The X-ray patterns of the catalysts used can be seen in Fig. S2 and S3. It is observed that all catalysts have a very crystalline structure showing narrow peaks with high intensity peaks in small angular intervals. The observed XRD patterns were checked with databases in the literature (IZA and ICDD). All patterns are representative of crystalline HBEA, HY and HZSM-5, which agrees with our previous studies [46-48]. Also, silica-alumina shows a halo amorphous, as well as niobic acid, which correspond with our previous characterizations [49,50]. Silica alumina shows a broad hump at 2θ = 15° to 30°; niobic acid displays two broad humps at 2θ = 10° to 20° and 20° to 35°; The catalyst with 20% HPW/Nb_2O_5 also shows a broad hump approximately at 20° to 35°.

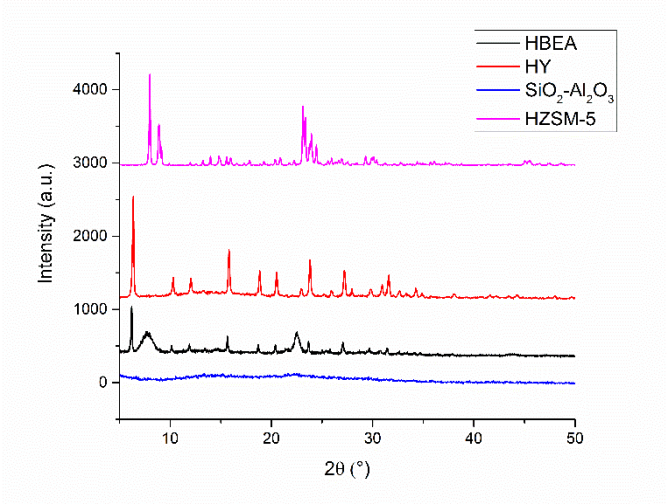

Fig. S2: XRD patterns of the aluminosilicates.

(A) (B)

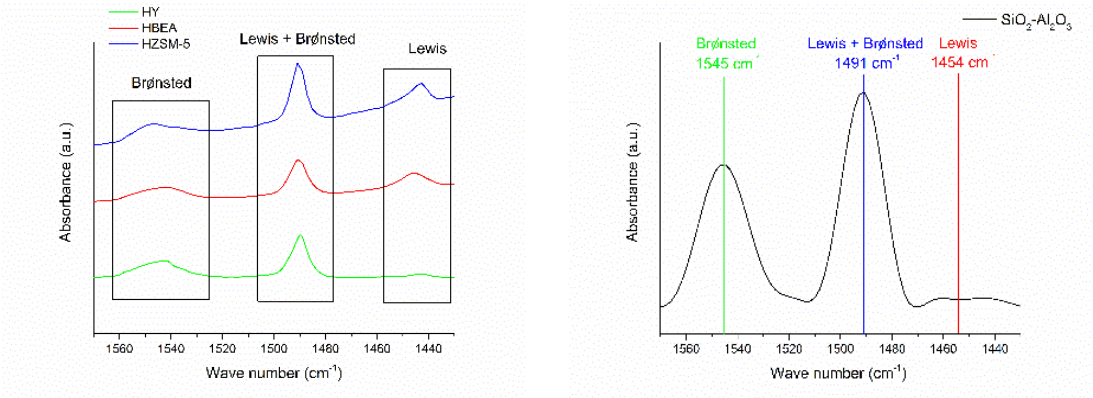

Fig. S3: FT-IR spectra of (A) crystalline aluminosilicates and (B) amorphous silica-alumina after adsorption of pyridine.

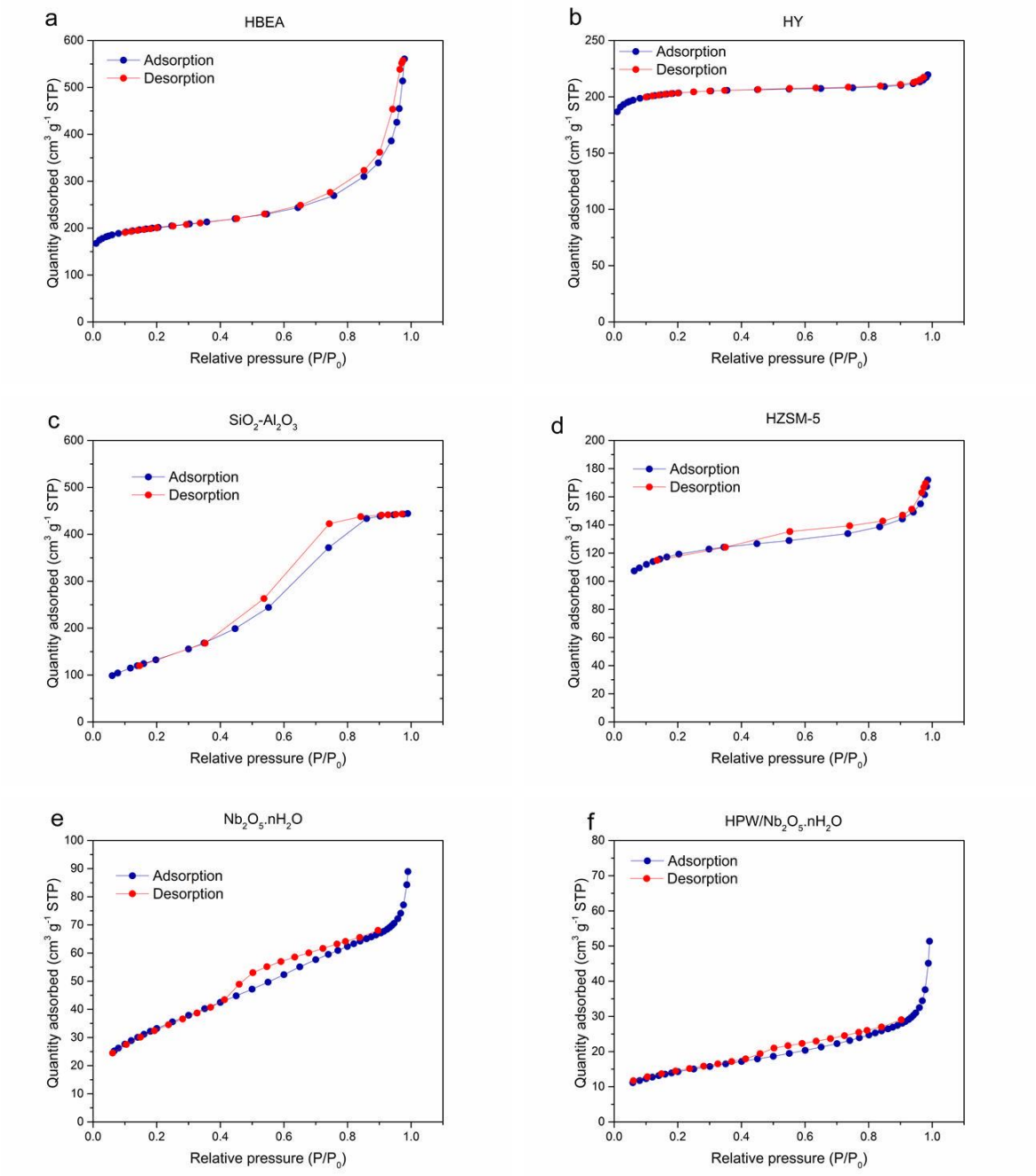

Fig. S4: Adsorption and desorption isotherms of N_2 at -196 °C of the catalysts.

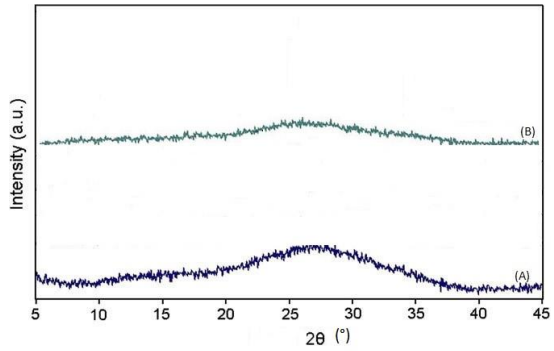

Fig. S5: XRD pattern of: (a) Nb_2O_5; (b) 20% HPW/Nb_2O_5

(A) (B)

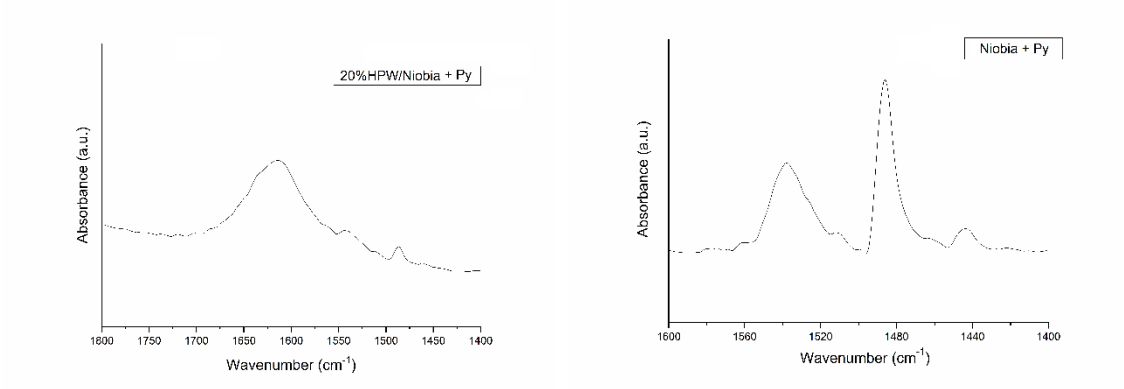

Fig. S6: FT-IR spectra of: (A) 20% HPW/Nb_2O_5 and (B) Nb_2O_5 after adsorption of pyridine.