Supporting Information

Unusual Deactivation of HZSM-5 Zeolite in Methanol to Hydrocarbon Reaction

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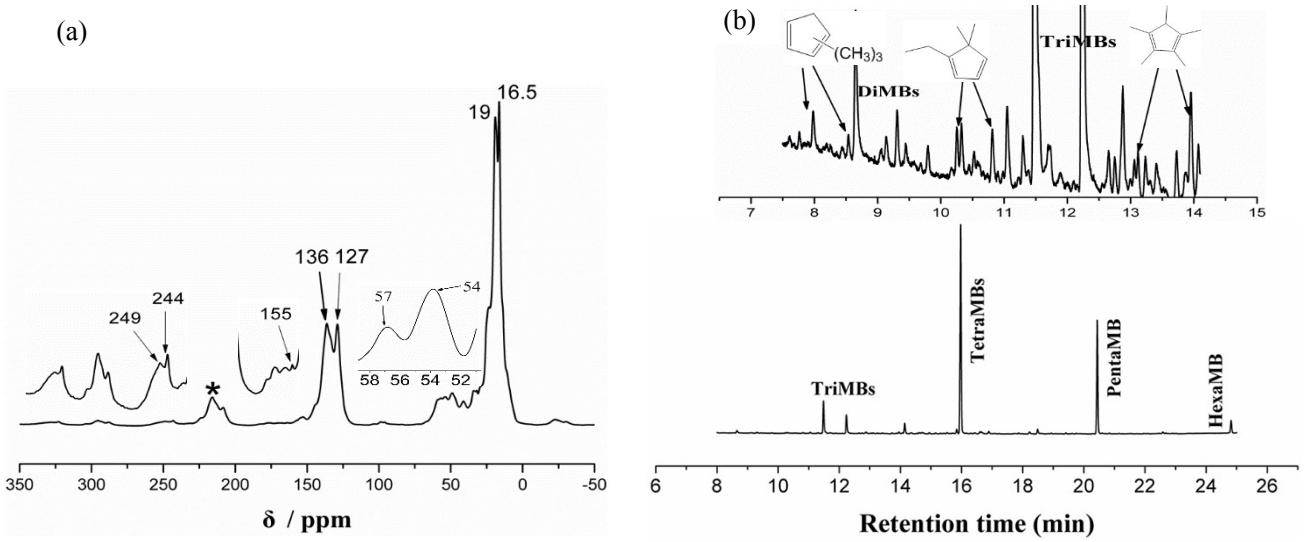

Figure S1. ^{13}C CP MAS NMR spectra of HZSM-5 with retained organics when the temperature reached 287 °C for the continuous-flow ^{13}C-methanol TP-MTH reaction (a) and GC-MS analysis of retained material in catalyst when temperature reached 287 °C for the continuous-flow ^{12}C-methanol TP-MTH reaction (b). The asterisk denotes spinning side bands.

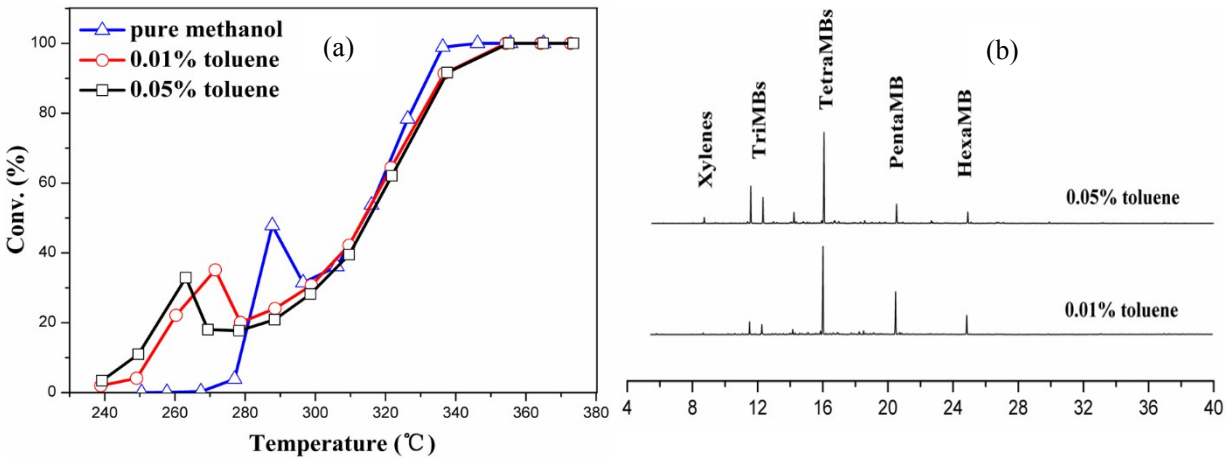

Figure S2. Effect of co-feeding 0.01 % and 0.05 % (wt. %) toluene on methanol conversion (a) and GC-MS analysis of retained substances at the deactivation point for methanol co-fed with different amount of toluene (b) during the TP-MTH reaction.

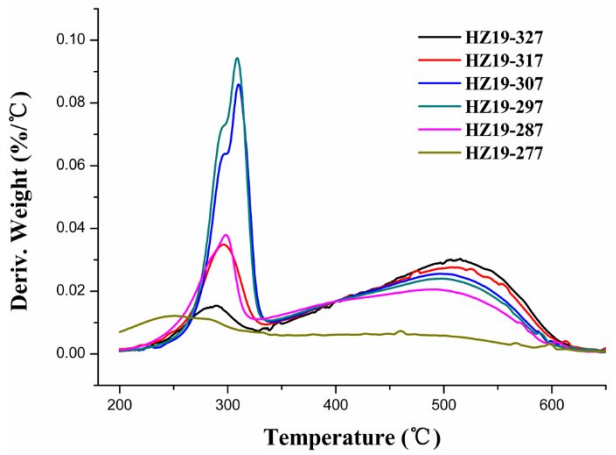

Figure S3. DTG results of retained material during TP-MTH reaction.

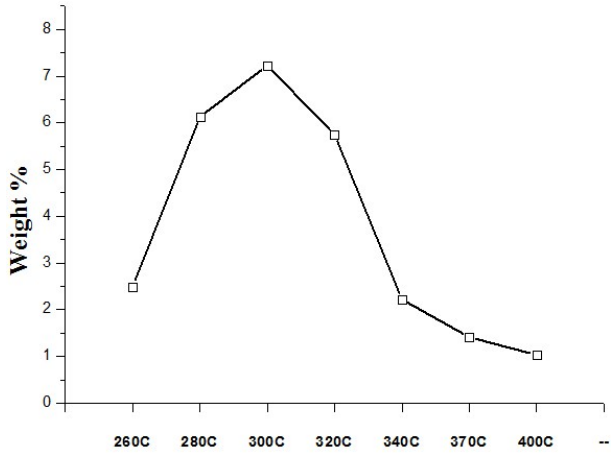

Figure S4. Amount of retained species after 30 min of MTH reaction at different reaction temperatures.

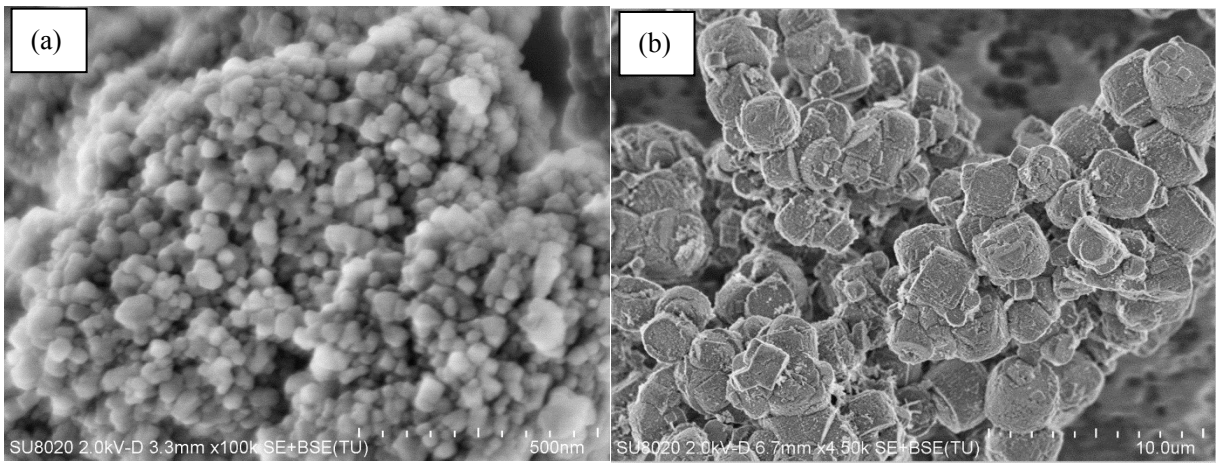

Figure S5. SEM images of the samples for NZ-20 (a) and MZ-21 (b).

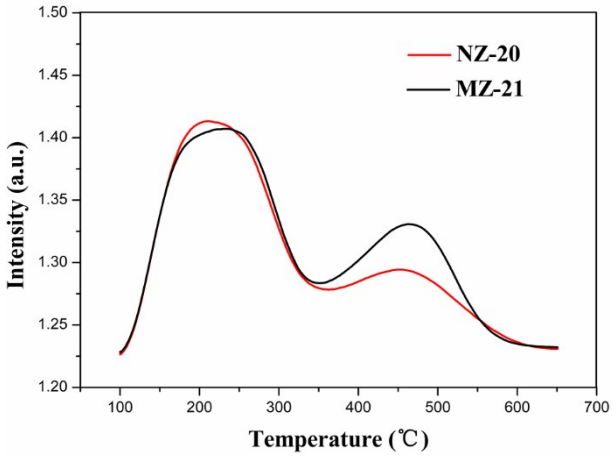

Figure S6. NH_3-TPD profiles of NZ-20 and MZ-20.

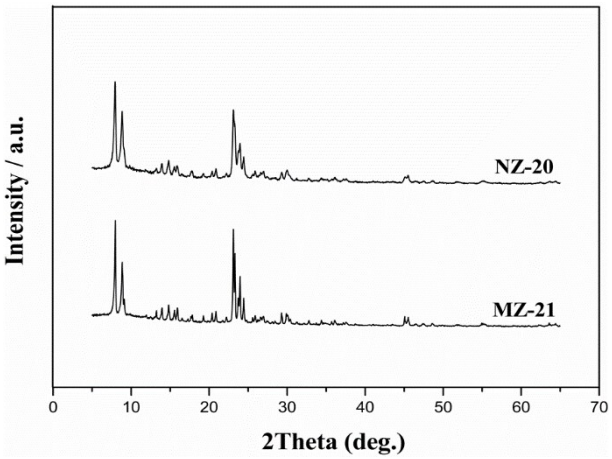

Figure S7. XRD patterns of the two synthesized HZSM-5 catalysts

Table S1. Elemental composition and N_2 sorption characteristics of NZ-20 and MZ-20

Sample	Si/Al[a]	S_{BET} (m^2/g)	S_{micro} (m^2/g)[b]	S_{ext} (m^2/g)[b]	V_{total} (mL/g)[c]
NZ-20	20	404	243	161	0.12
MZ-21	21	356	336	20	0.154

[a] XRF

[b] t-method

[c] Volume adsorbed at $p/p_0 = 0.97$