Studies of propene conversion over H-ZSM-5 demonstrate the importance of propene as an intermediate in methanol-to-hydrocarbons chemistry – Supplementary Information

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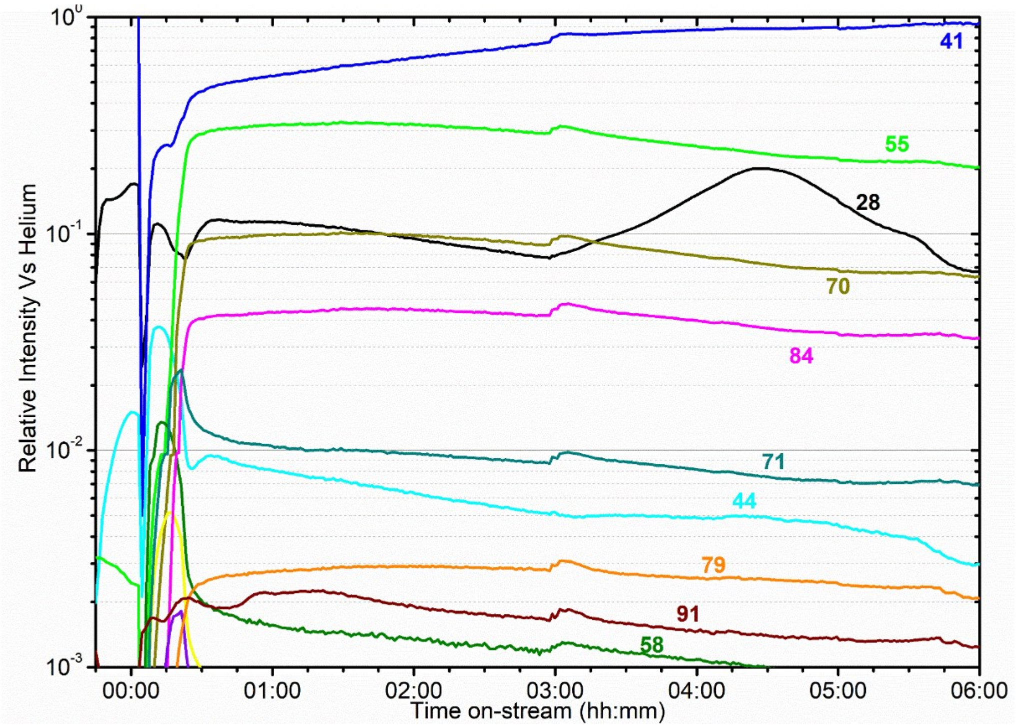

Figure S1: Mass spectrum vs. time of the eluent gas flow from the reaction of propene over ZSM-5 for 6 hours at 473 K. Numbers on the plots indicate the atomic mass numbers of each trace.

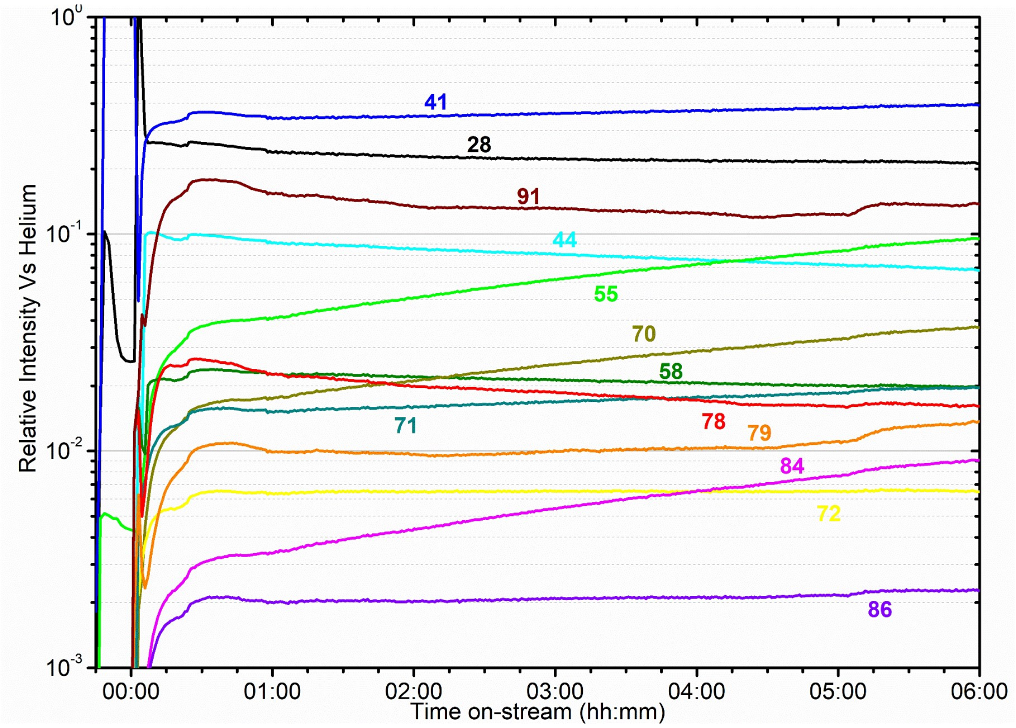

Figure S2: Mass spectrum vs. time of the eluent gas flow from the reaction of propene over ZSM-5 for 6 hours at 573 K. Numbers on the plots indicate the atomic mass numbers of each trace.

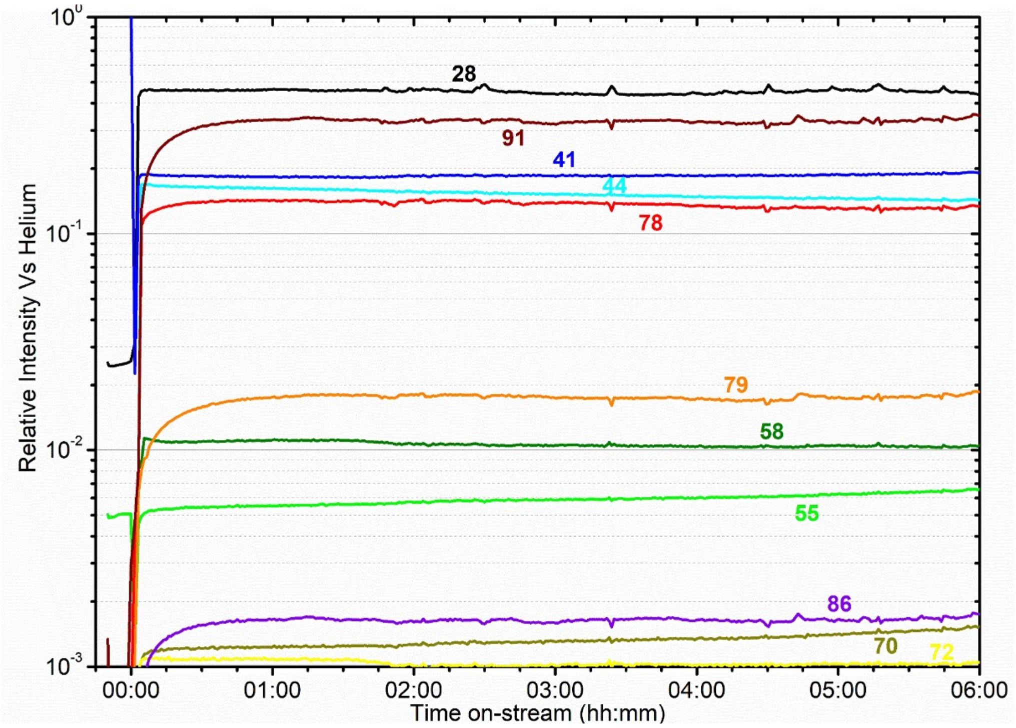

Figure S3: Mass spectrum vs. time of the eluent gas flow from the reaction of propene over ZSM-5 for 6 hours at 673 K. Numbers on the plots indicate the atomic mass numbers of each trace.

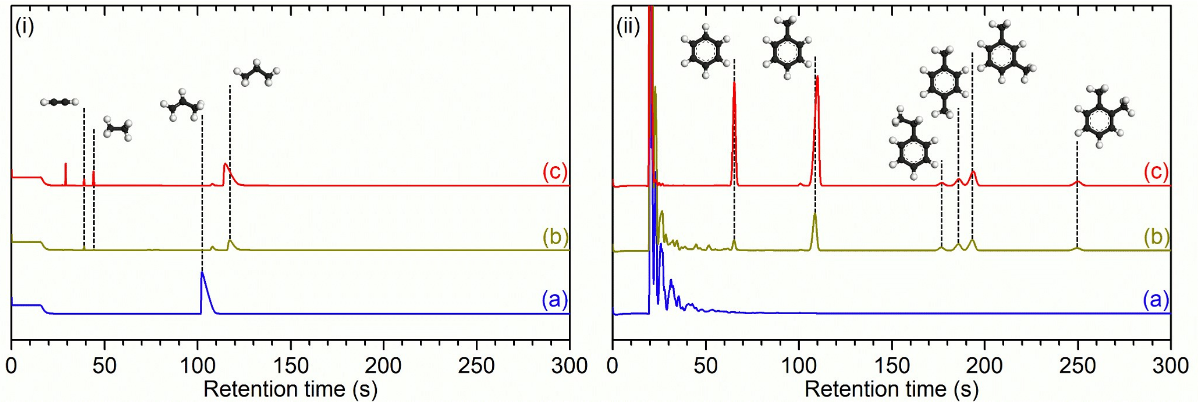

Figure S4: GC traces collected at 6 hours on-stream of the eluent gas flow from the reaction of propene over ZSM-5 at 473 K (a), 573 K (b) and 673 K (c). Separation columns are: (i) 10 m PoraPLOT Q; (ii) 10m CP-Wax 52CB. The identities of significant peaks are highlighted.

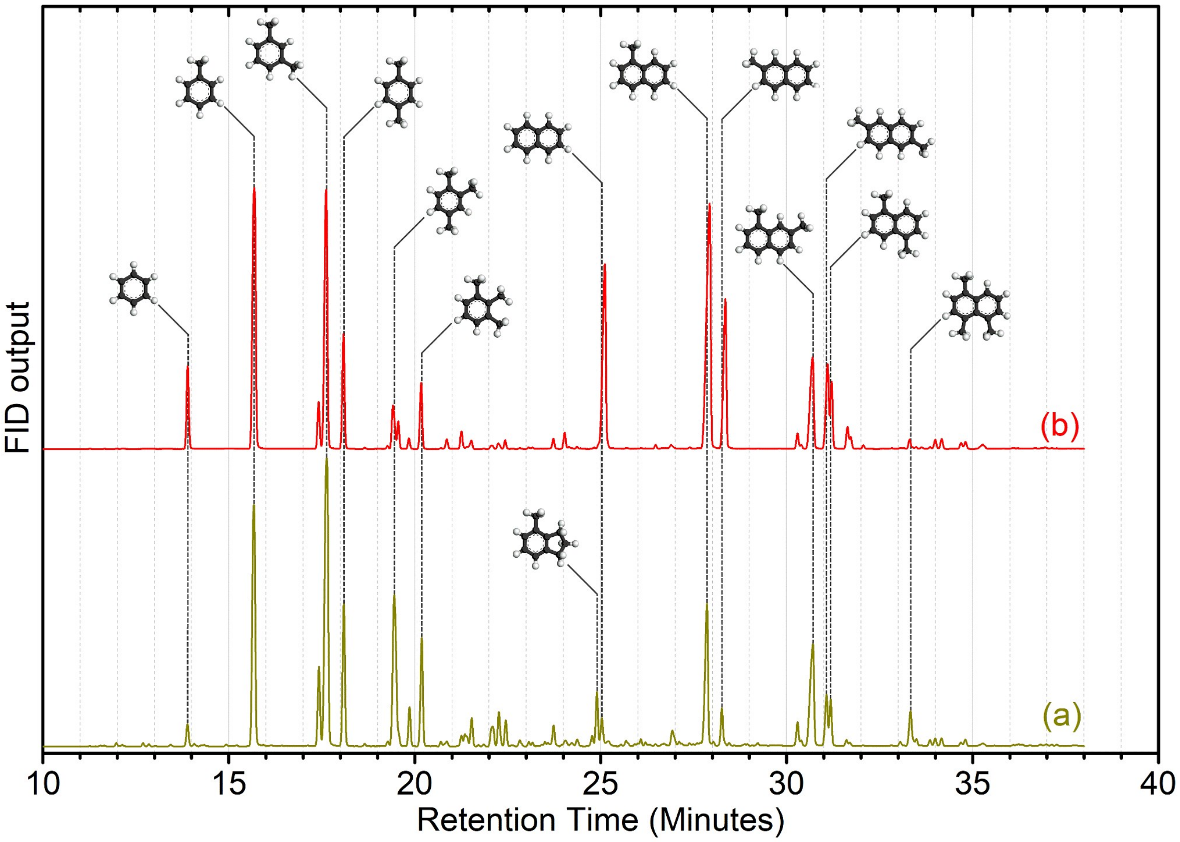

Figure S5: GCMS traces of the condensable product fraction for the reaction of propene over ZSM-5 at 573 K (a) and 673 K (b). Identities of significant peaks are highlighted.

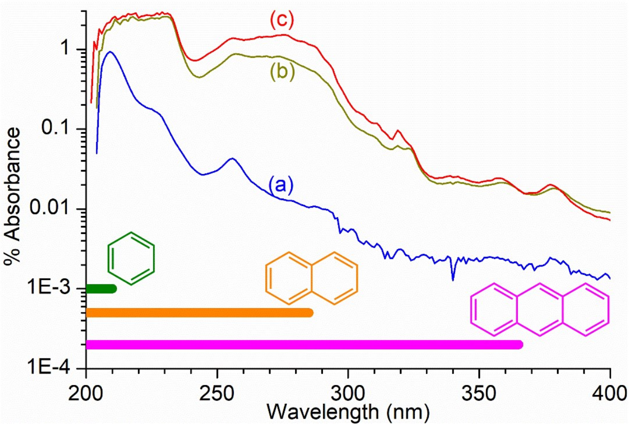

Figure S6: UV-Vis spectra of the condensable product fraction for the reaction of propene over ZSM-5 at 473 K (a), 573 K (b) and 673 K (c). Analysed samples were 100 ppm solutions in cyclohexane. The absorption ranges associated with typical mono-, bi- and tricyclic polyaromatics are highlighted.

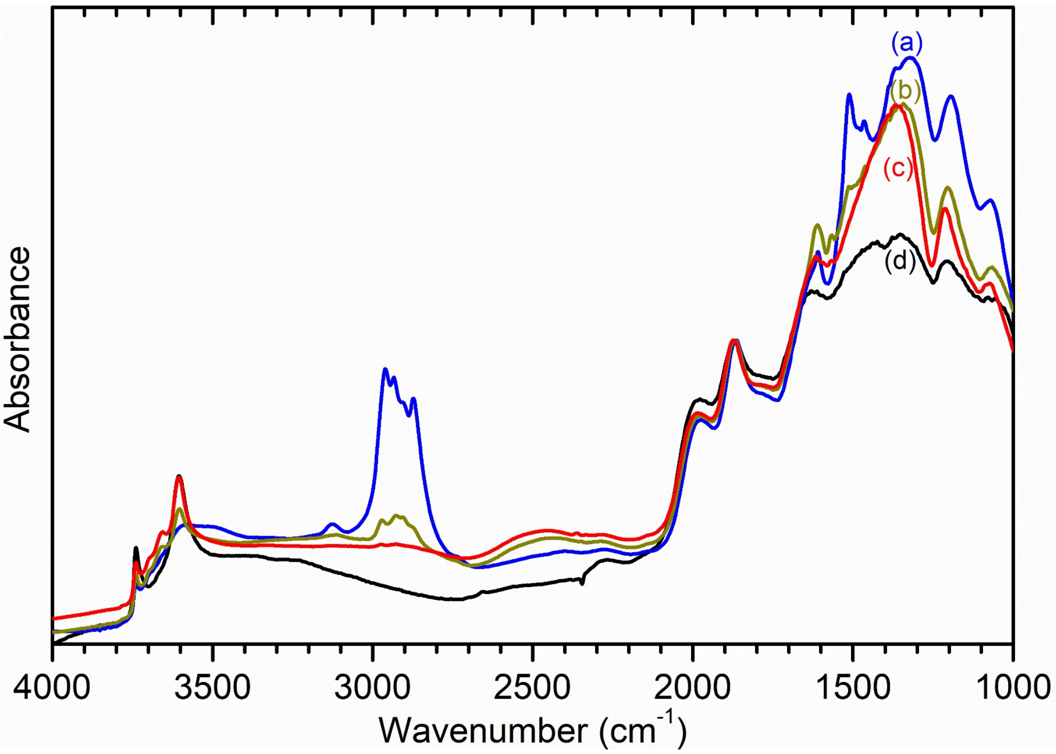

Figure S7: Infrared spectra of ZSM-5 catalysts after reaction at 473 K (a), 573 K (b) and 673 K (c) compared with the spectrum of the clean, dried zeolite (d). Spectra collected using DRIFTS and intensities normalised to the value of the silanol deformation at 1870 cm^{-1} to allow direct comparison between samples.

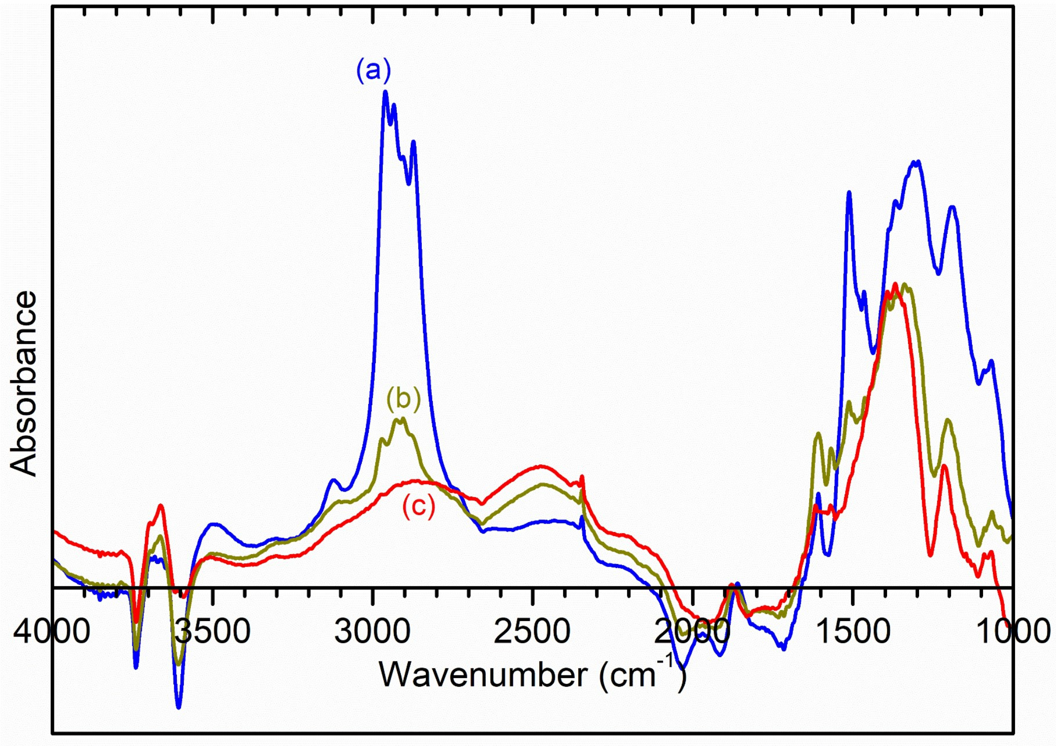

Figure S8: Difference spectra created by subtraction of the spectrum of the clean zeolite from the other traces in Figure S7.

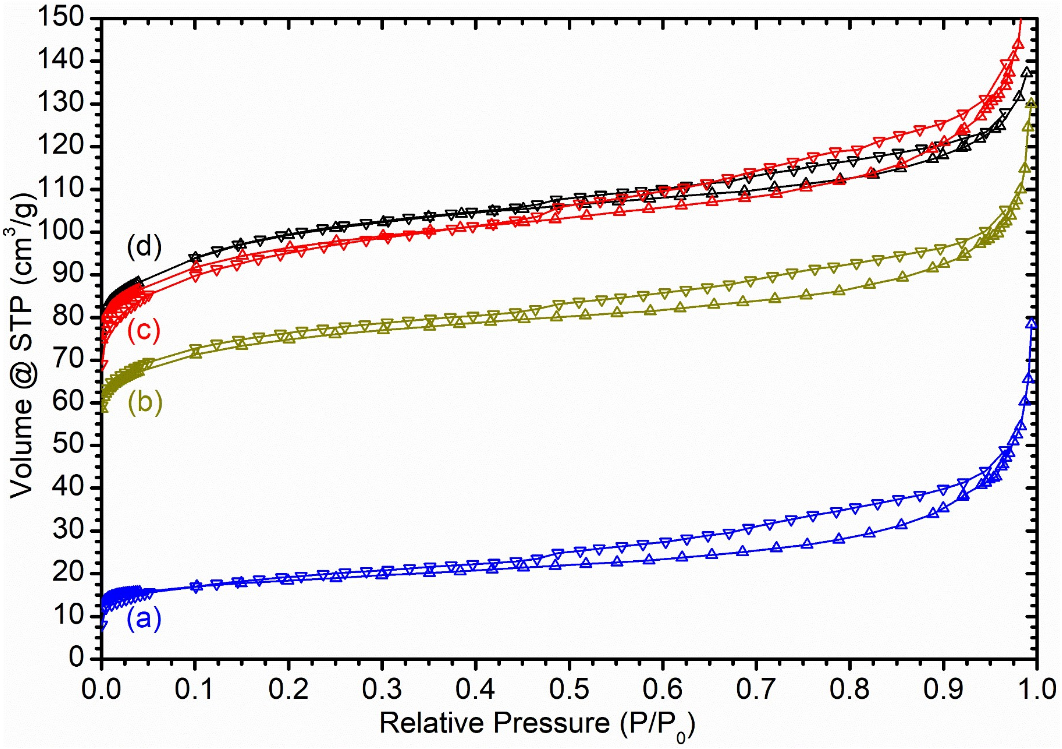

Figure S9: Adsorption (△) and desorption (▽) isotherms for N_2 at 77 K in ZSM-5 catalysts after reaction at 473 K (a), 573 K (b) and 673 K (c) compared with the isotherms in the clean, dried zeolite (d).

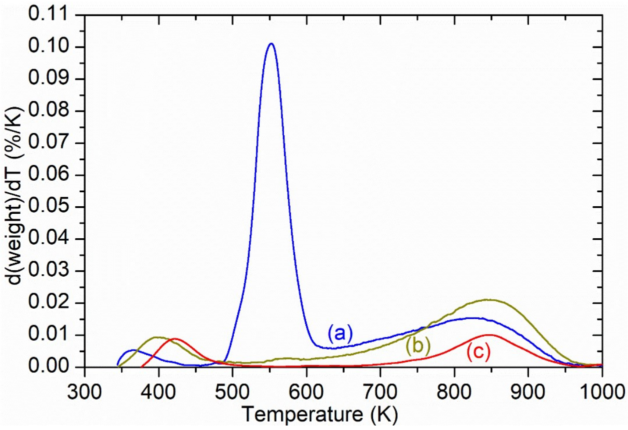

Figure S10: Rate of weight decrease during thermogravimetric analysis of samples of ZSM-5 catalysts after reaction at 473 K (a), 573 K (b) and 673 K (c) in 10% oxygen showing the temperatures required for oxidation of different coke species in each sample.