

# Electronic Supplementary Material

## Conversion of syngas into lower olefins over a hybrid catalyst system

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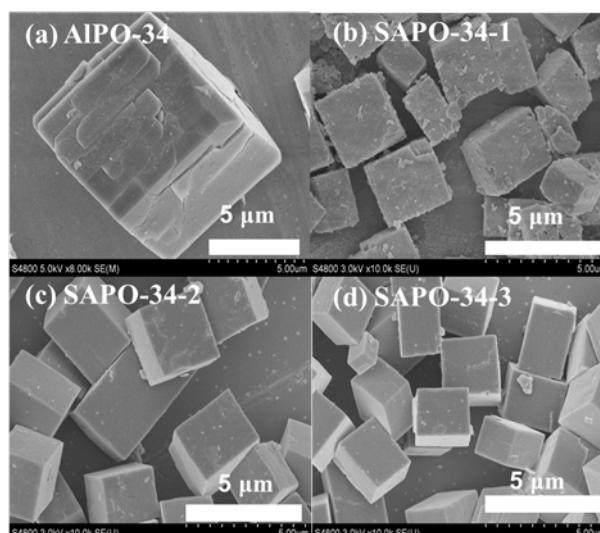


Figure S1 SEM images of zeolites (a) AIPO-34; (b) SAPO-34-1; (c) SAPO-34-2; (d) SAPO-34-3

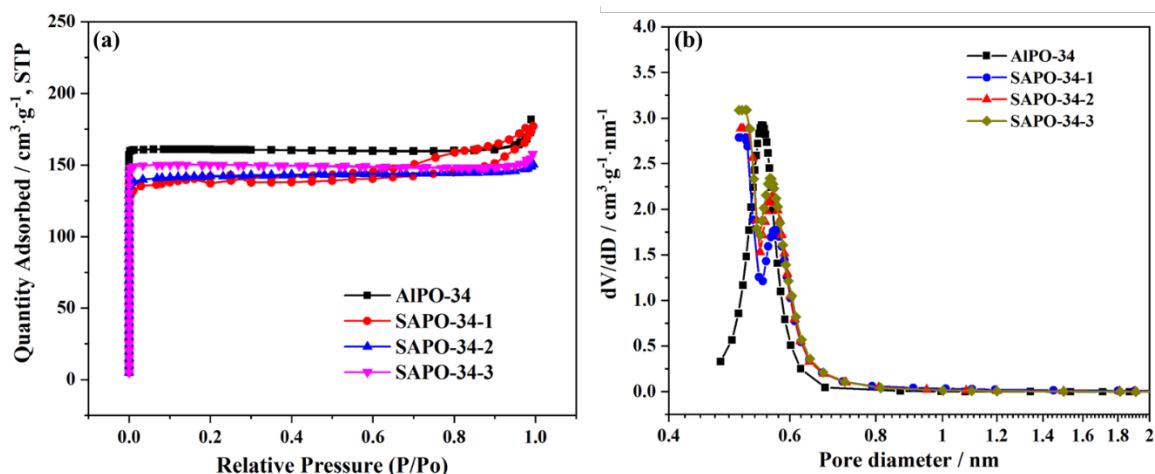


Figure S2 (a) N<sub>2</sub> adsorption-desorption isotherms, (b) pore size distribution of all zeolites

Table S1 Physical properties of all zeolites

Sample	Surface area / m <sup>2</sup> ·g <sup>-1</sup>			Pore volume / cm <sup>3</sup> ·g <sup>-1</sup>		
	S <sub>BET</sub> <sup>a</sup>	S <sub>mico</sub> <sup>b</sup>	S <sub>ext</sub>	V <sub>total</sub>	V <sub>micro</sub> <sup>c</sup>	V <sub>meso</sub> <sup>d</sup>
AIPO-34	448	434	14	0.301	0.268	0.033
SAPO-34-1	463	371	92	0.317	0.183	0.134
SAPO-34-2	449	428	21	0.226	0.211	0.015
SAPO-34-3	461	446	15	0.231	0.215	0.016

a: Determined by BET method. b: Measured by t-plot curve. c: Measured by t-plot curve. d: Calculated by BJH method.

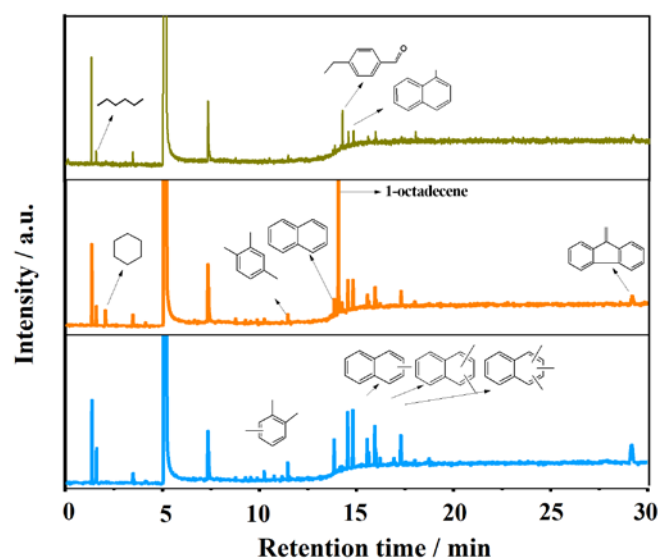


Figure S3 GC-MS analysis of surface carbon species of SAPO-34 zeolites at TOS = 30 h

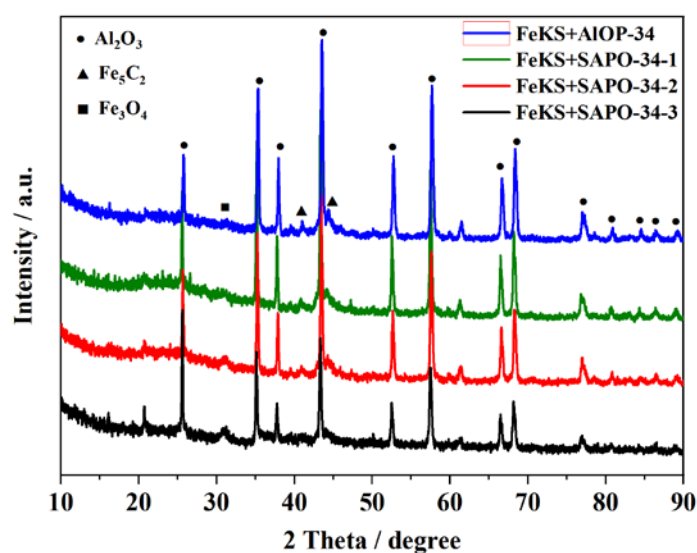


Figure S4 XRD patterns of used Fe-based catalysts

Table S2 The quantity of acidity and element content of zeolites

Sample	Total acid amounts / mmol.g <sup>-1</sup> a			Mole composition
	strong acid	weak acid	total	
AlPO-34	-	0.201	0.201	Si <sub>0.002</sub> Al <sub>0.512</sub> P <sub>0.486</sub>
SAPO-34-1	0.504	0.608	1.112	Si <sub>0.122</sub> Al <sub>0.545</sub> P <sub>0.333</sub>
SAPO-34-2	0.550	0.663	1.213	Si <sub>0.114</sub> Al <sub>0.484</sub> P <sub>0.402</sub>
SAPO-34-3	0.759	1.025	1.784	Si <sub>0.116</sub> Al <sub>0.488</sub> P <sub>0.397</sub>

a: Determined by NH<sub>3</sub>-TPD. b: Measured by XRF.

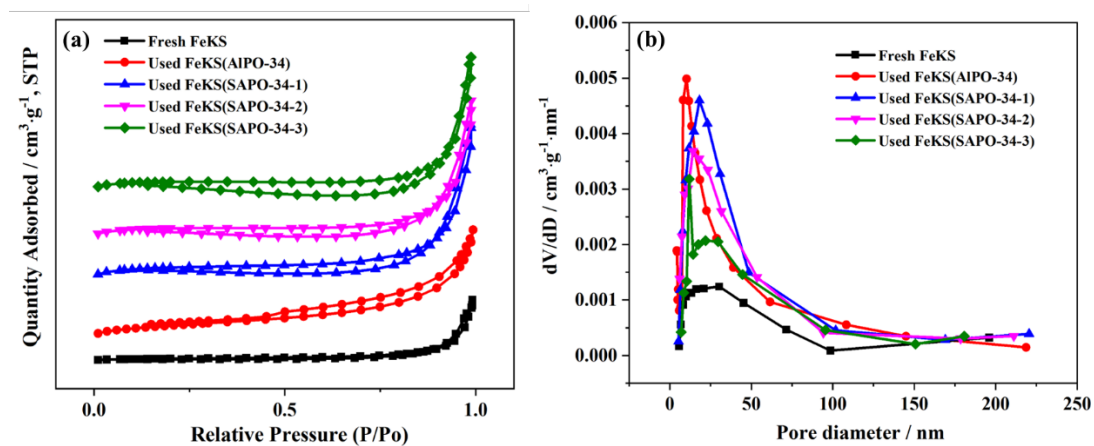


Figure S5 (a)  $N_2$  adsorption-desorption isotherms, (b) pore size distribution of used Fe-based catalysts

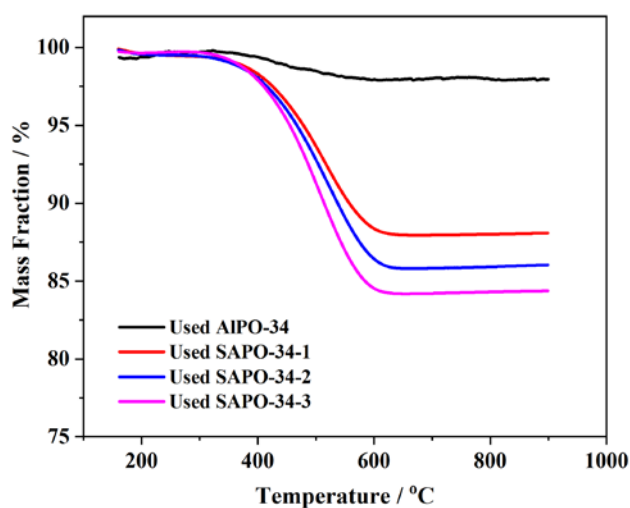


Figure S6 TG curves of zeolites after 30 h

Table S3 Weight loss and rate of weight loss of zeolites

Samples	Used AIPO-34	Used SAPO-34-1	Used SAPO-34-2	Used SAPO-34-3
TOS / h	30	30	30	30
Coke / %, $g/g_{cat}$	2.04	12.07	14.17	15.57
$R_{coke}$ $/10^{-3}mg \cdot (min \cdot g_{cat})^{-1}$	2.34	13.43	13.90	17.63