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Method for Calculating Carbon Balance

The value of carbon balance was obtained using the following equation:

$$\text{Carbon balance} = \frac{C_6H_{6\,\text{outlet}} + CO_{2\,\text{outlet}} + CO_{\text{outlet}} + \sum_1^a aC_aH_{b\,\text{outlet}}}{C_6H_{6\,\text{inlet}} + CO_{2\,\text{intet}}} * 100\%$$

Where $C_aH_{b\,\text{outlet}}$ ($a \geqslant 1$) represents the moles of hydrocarbons at the outlet; the subscripts "inlet" and "outlet" indicate the molar quantities at the outlet and inlet.

The internal standard method was used to determine the volume fraction of each component with N_2 as the internal standard. The relative correction factor was calculated using the following equation:

$$\lambda = \frac{S_{N_2} * C}{C_{N_2} * S}$$

where C represents the volume fraction of the component, and S represents the peak area in the chromatogram.

The formula for the conversion rate and selectivity of each substance is as follows:

Benzene conversion rate:

$$\alpha = \frac{C_6H_{6inlet} - C_6H_{6outlet}}{C_6H_{6intlet}}$$

Liquid phase aromatics product distribution:

$$\text{Sel } C_aH_b = \frac{C_aH_{boutlet}}{\sum C_iH_{joutlet}}$$

C_iH_j represents the aromatics products, such as toluene, xylene, ethylbenzene, propylbenzene, and other C_{9+}. $C_iH_{joutlet}$ and $C_aH_{boutlet}$ represent the moles number of individual aromatics at the outlet.

Gas phase hydrocarbons distribution:

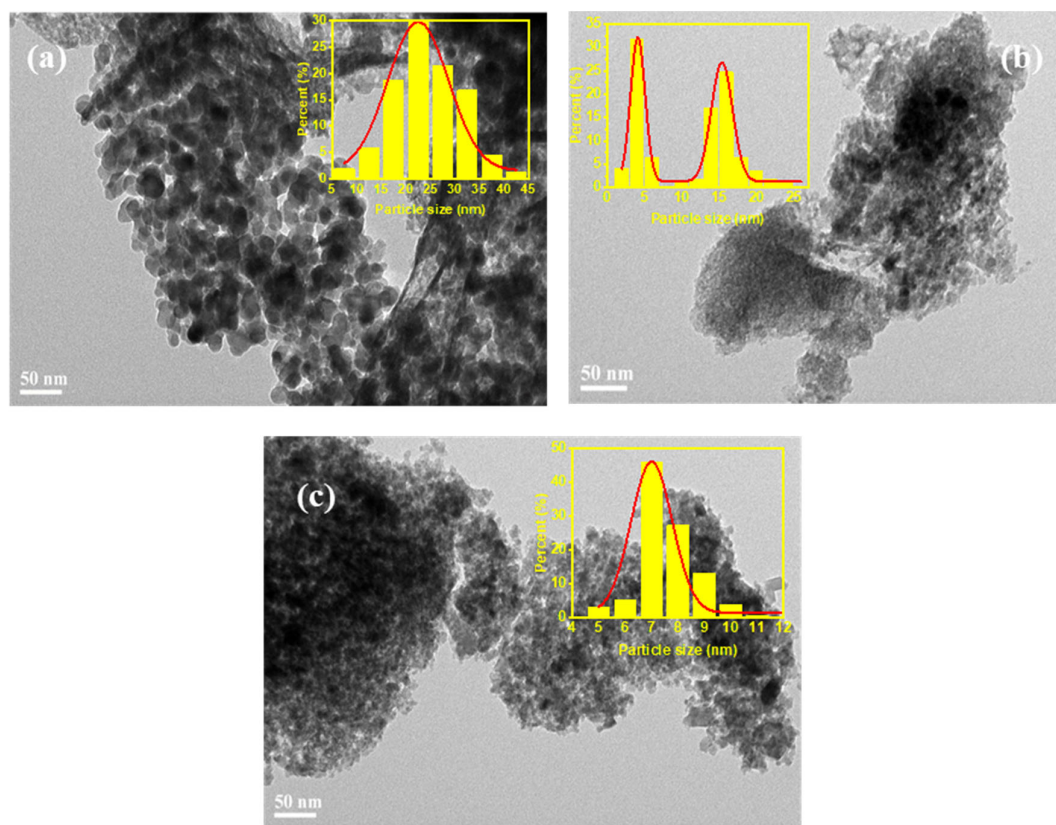$$\text{Sel } C_aH_b = \frac{aC_aH_{boutlet}}{\sum iC_iH_{joutlet}}$$

Figure S1. TEM images of (a) $ZnGaO_x$; (b) $ZnAlO_x$; (c) $Zn_2Ga_{0.5}Al_{1.5}O_x$.
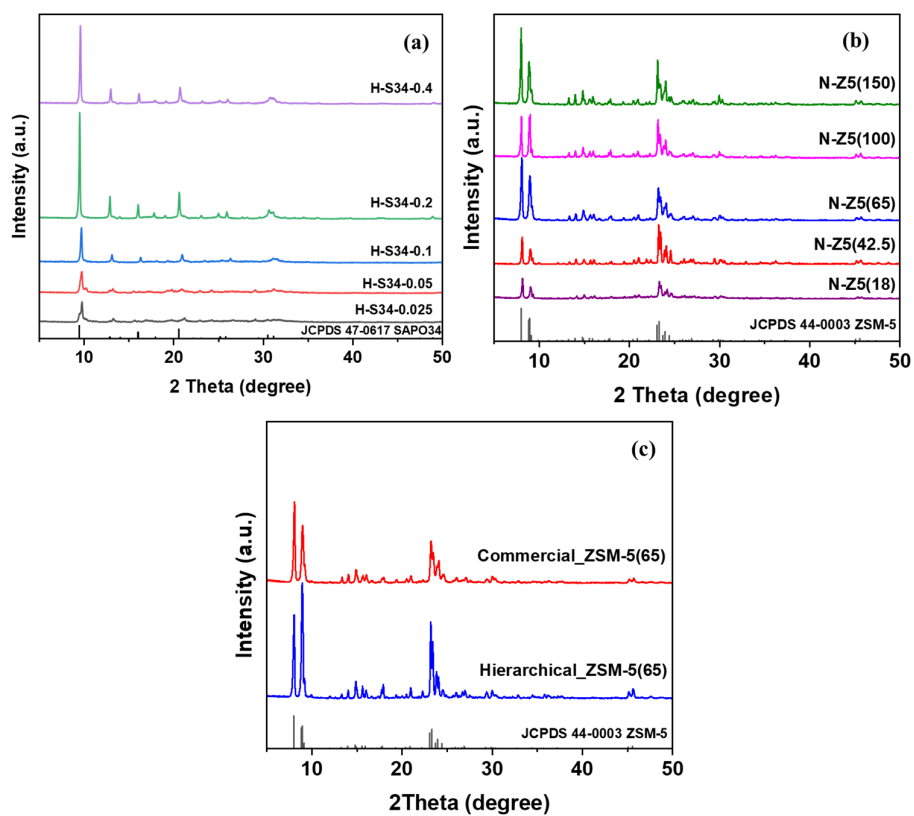
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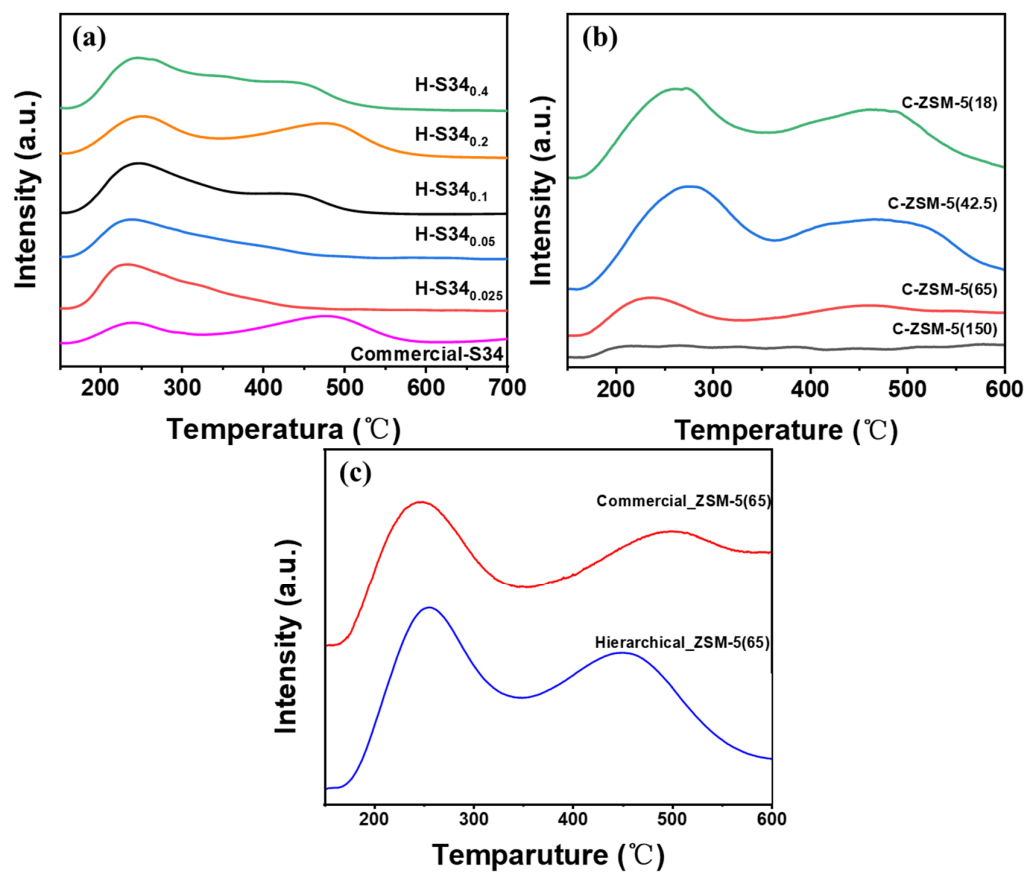
Figure S3. NH$_3$-TPD patterns of (a) hierarchical SAPO-34 with different Si/Al ratio, (b) commercial ZSM-5 zeolites, (c) comparison of commercial and hierarchical ZSM-5 (Si/Al=65)
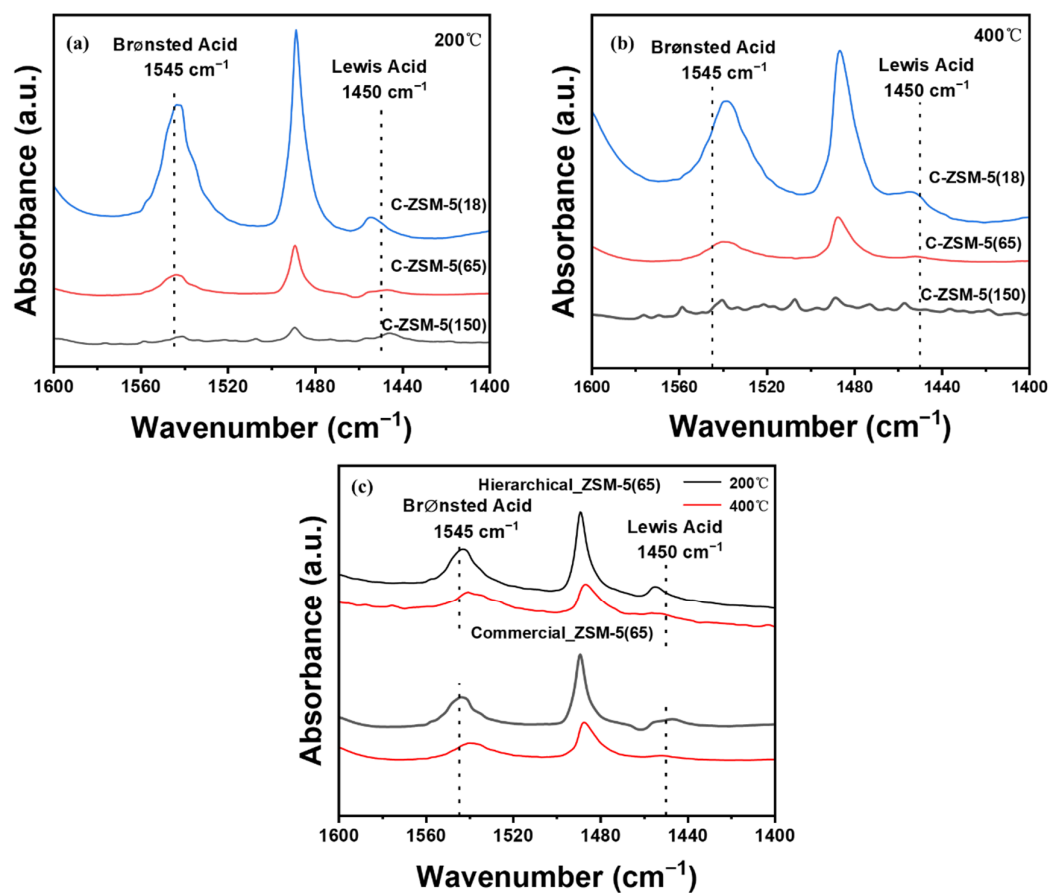
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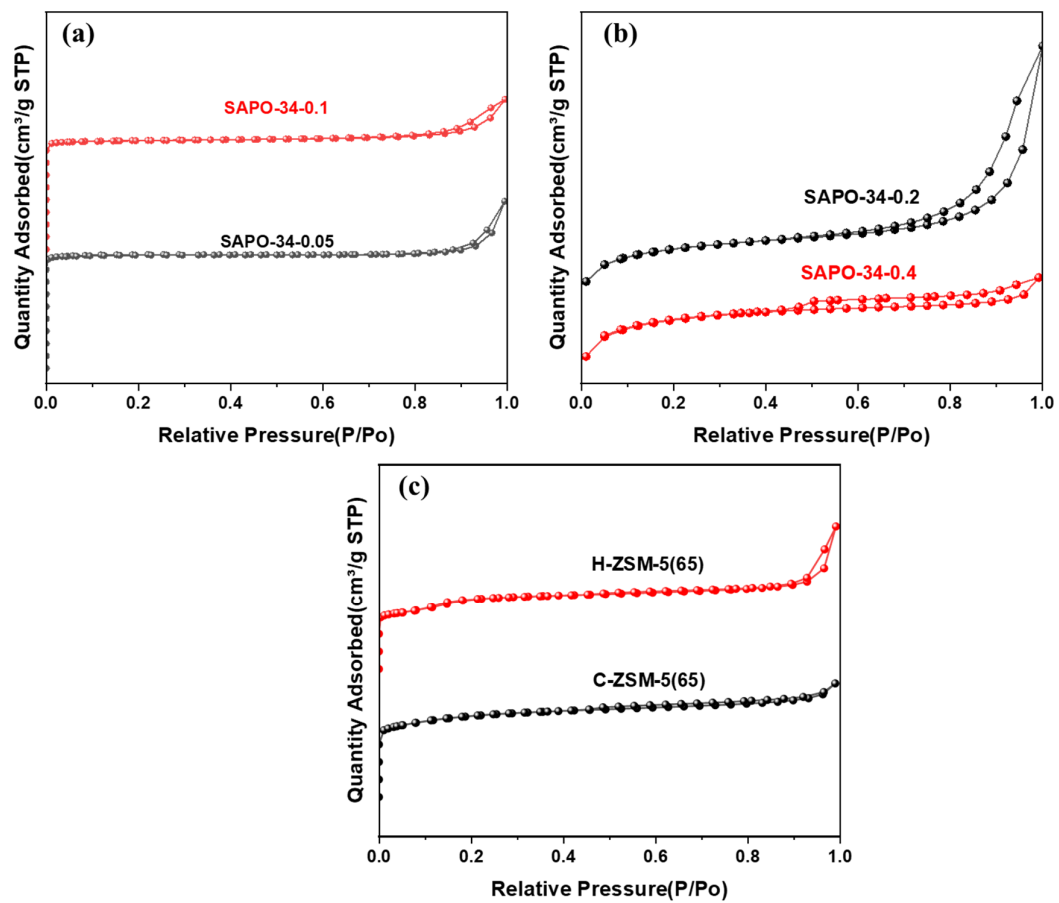
Figure S5. Nitrogen adsorption isotherms of SAPO-34 and ZSM-5.

Table S1. Textural properties and surface compositions of SAPO-34 and ZSM-5.

Sample	$S_{BET}/(m^2 \cdot g^{-1})$	$S_{ext}/(m^2 \cdot g^{-1})$	$S_{micro}/(m^2 \cdot g^{-1})$	$V_{total}/(cm^3 \cdot g^{-1})$	$V_{micro}/(cm^3 \cdot g^{-1})$
SAPO-34-0.025	551	14	0.25	0.33	536
SAPO-34-0.05	615	13	0.31	0.45	601
SAPO-34-0.1	593	24	0.29	0.41	570
SAPO-34-0.2	476	16	0.21	0.30	459
SAPO-34-0.4	481	10	0.22	0.24	471
C-SAPO-34	2	1	0	0	1
H-ZSM-5(65)	366	137	229	0.29	0.1