Mechanism of tetralin conversion on zeolites for production of benzene derivatives

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Figure Captions

Figure S1 Difference spectra of IR $A(T)$-$N(T)$ [(spectrum after ammonia adsorption) – (spectrum before ammonia adsorption)] and a spectrum at 373 K before ammonia adsorption as a reference.

Figure S2 Difference spectra of IR $A(T)$-$N(T)$ [(spectrum after ammonia adsorption) – (spectrum before ammonia adsorption)] in region of bending vibration of ammonia adsorbed on zeolites (1200 – 1700 cm^{-1}).

Figure S3 Difference spectra of IR $A(T)$-$N(T)$ [(spectrum after ammonia adsorption) – (spectrum before ammonia adsorption)] in region of stretching vibration of hydroxyl group on zeolites (3400 – 3800 cm^{-1}).

Figure S4 Fitting of IR- and MS-TPD calculating TPD spectrum of Brønsted and Lewis acid site on zeolites. Black line: MS-TPD, blue line: IR-TPD of Brønsted acid sites (NH_4^+ (BAS)), red line: IR-TPD of Lewis acid sites (NH_3 (LAS)), grey line: the sum of NH_4^+ (BAS) and NH_3 (LAS)

Figure S5 Conversion and selectivity of the products as a function of time on stream in tetralin conversion over various framework zeolites

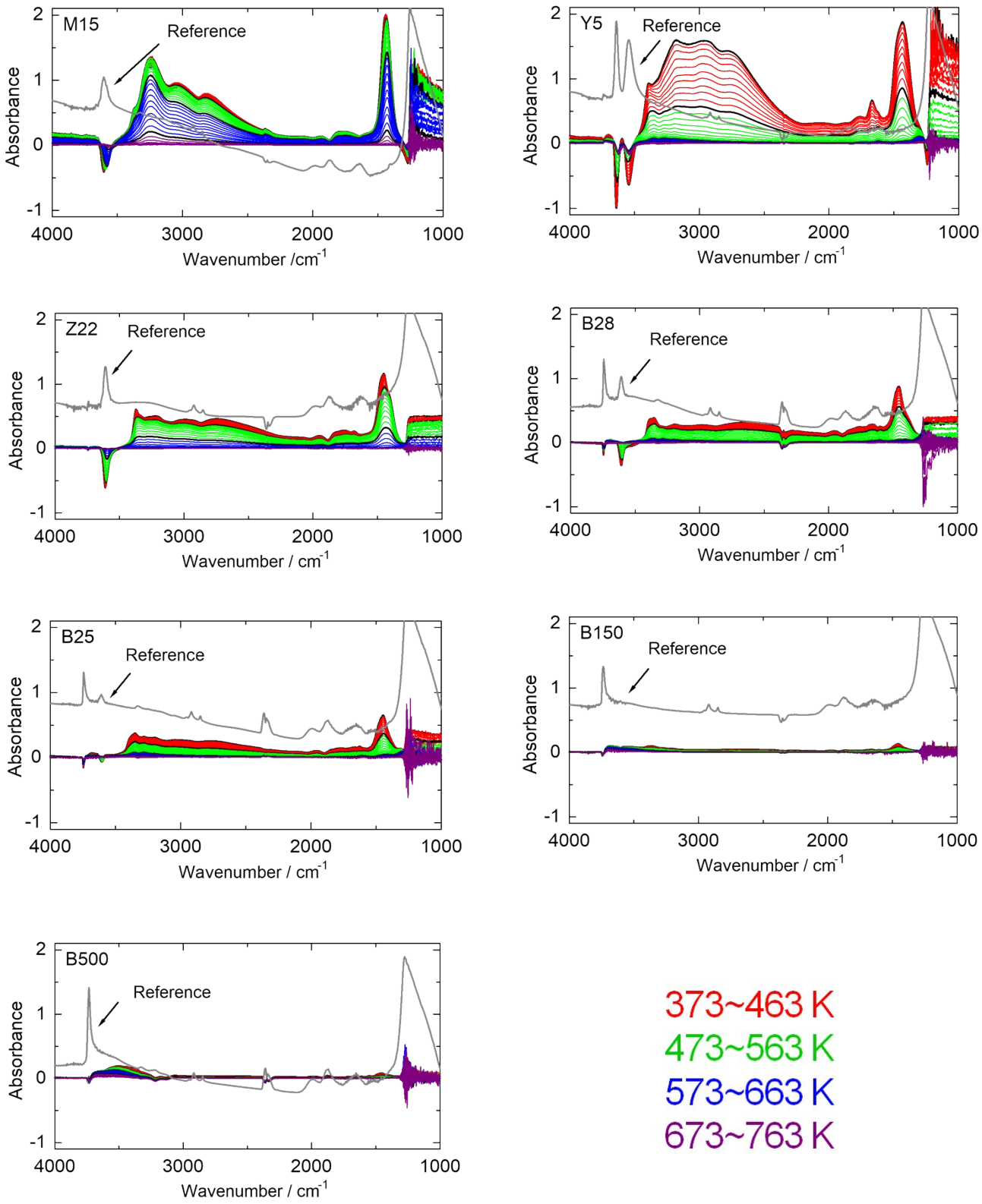
M15
Reference
Absorbance
Wavenumber /cm-1
Y5
Reference
Absorbance
Wavenumber / cm-1
Z22
Reference
Absorbance
Wavenumber / cm-1
B28
Reference
Absorbance
Wavenumber / cm-1
B25
Reference
Absorbance
Wavenumber / cm-1
B150
Reference
Absorbance
Wavenumber / cm-1
B500
Reference
Absorbance
Wavenumber / cm-1
373~463 K
473~563 K
573~663 K
673~763 K

Figure S1

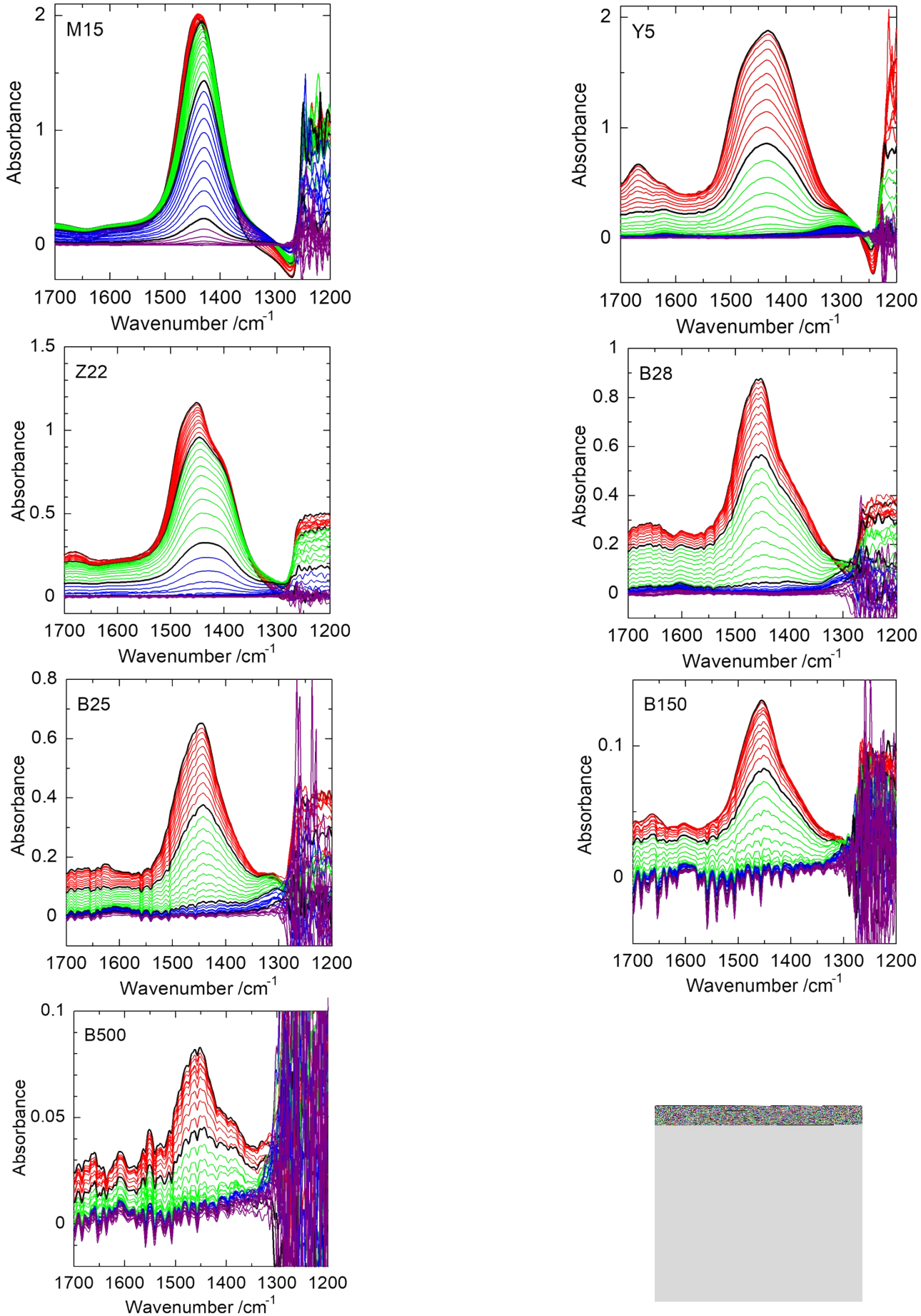

Figure S2

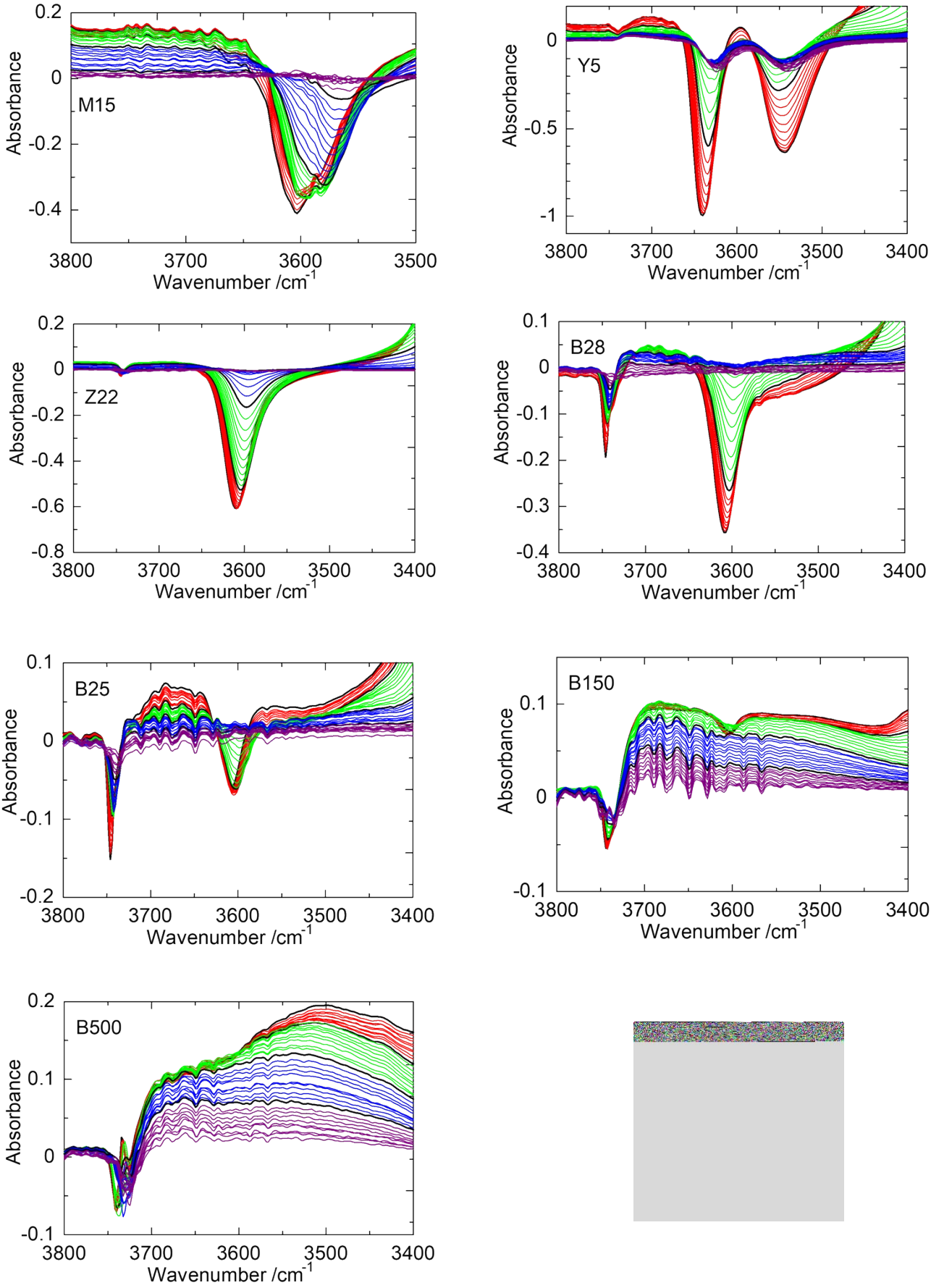

Figure S3

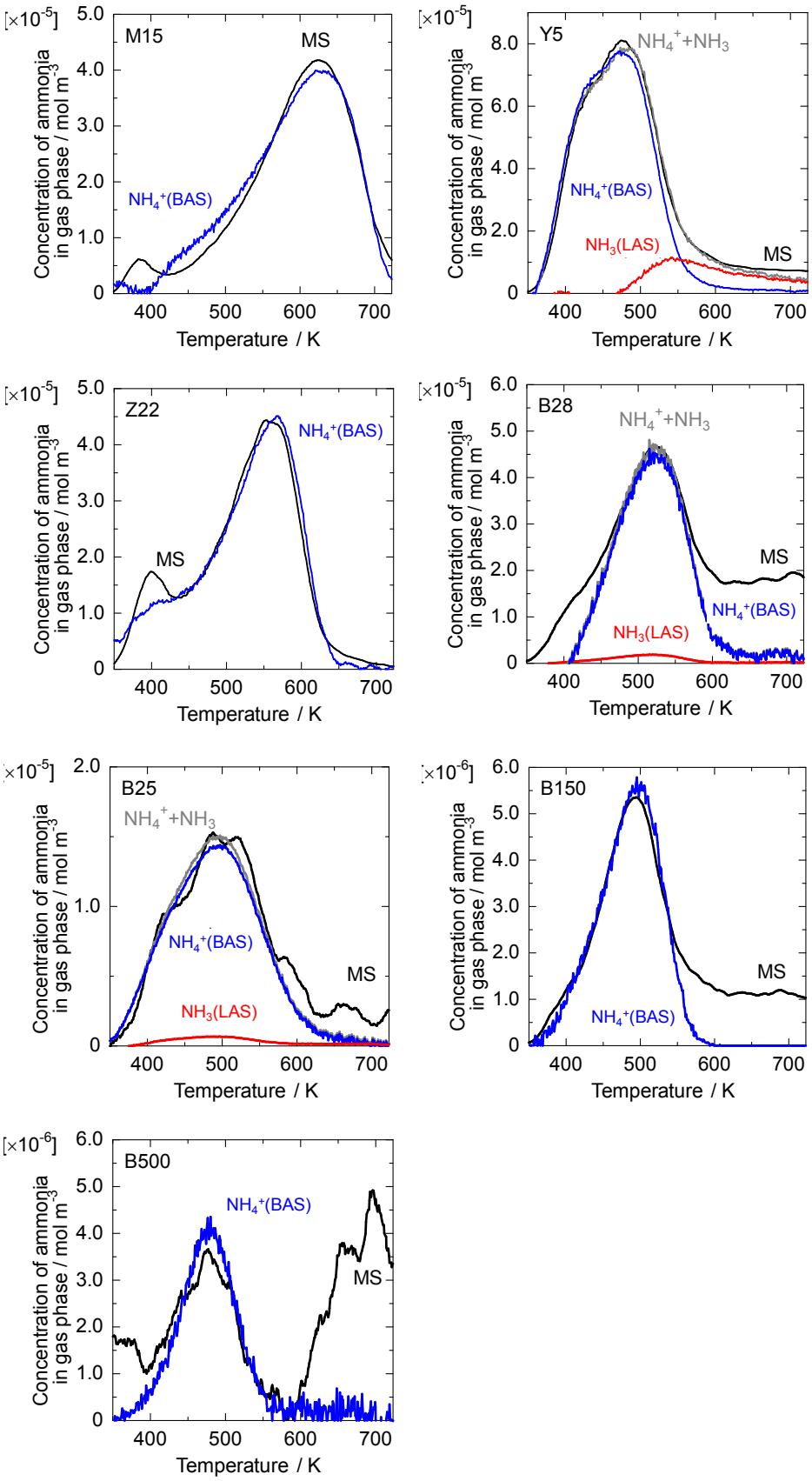
M15
MS
NH4+(BAS)
Y5
NH4+ +NH3
NH4+(BAS)
NH3(LAS)
MS
Z22
NH4+(BAS)
MS
B28
NH4+ +NH3
MS
NH4+(BAS)
NH3(LAS)
B25
NH4+ +NH3
NH4+(BAS)
MS
NH3(LAS)
B150
MS
NH4+(BAS)
B500
NH4+(BAS)
MS
Concentration of ammonia in gas phase / mol m-3
Temperature / K
[×10-5]
[×10-6]

Figure S4

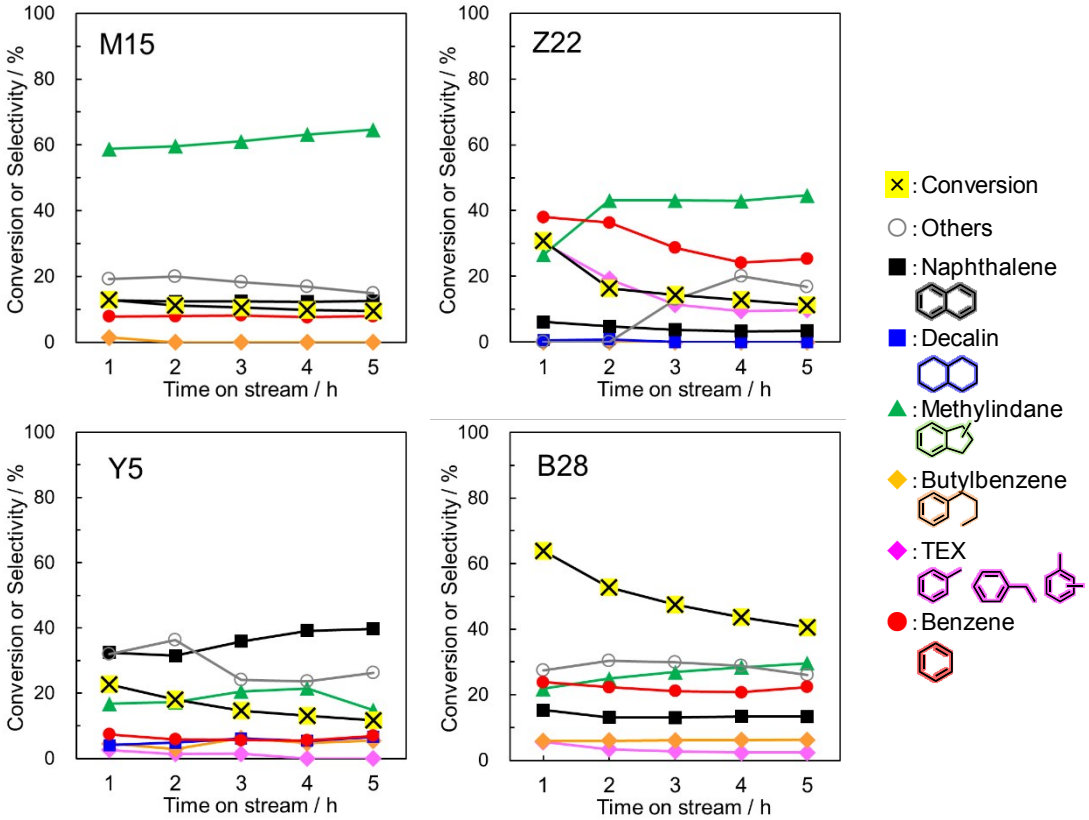
M15
Z22
Y5
B28
Conversion or Selectivity / %
Time on stream / h
: Conversion
: Others
: Naphthalene
: Decalin
: Methylindane
: Butylbenzene
: TEX
: Benzene

Figure S5