

Figure S1. XRD patterns of P-modified ferrierite zeolites calcined at 500 °C.

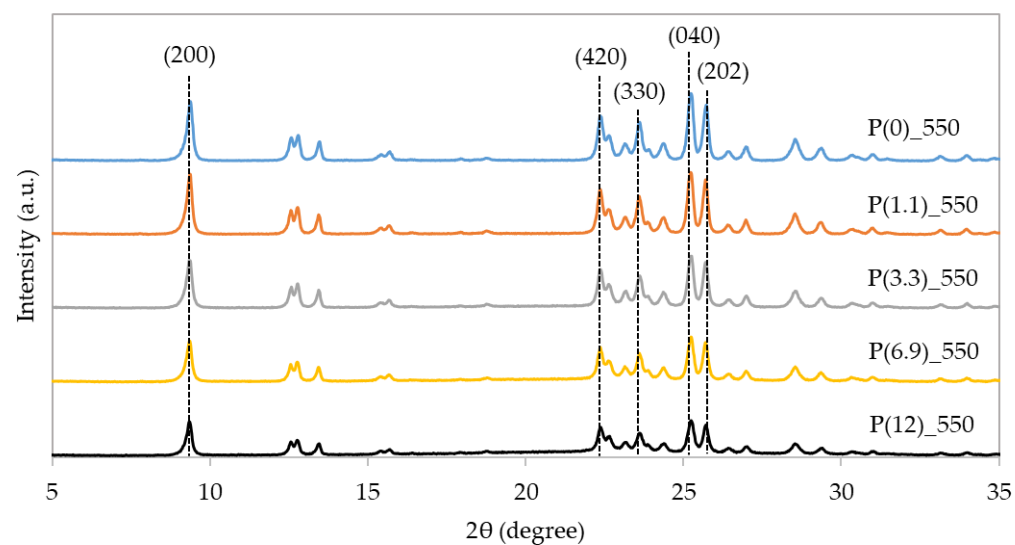


Figure S2. XRD patterns of P-modified ferrierite zeolites calcined at 550 °C.

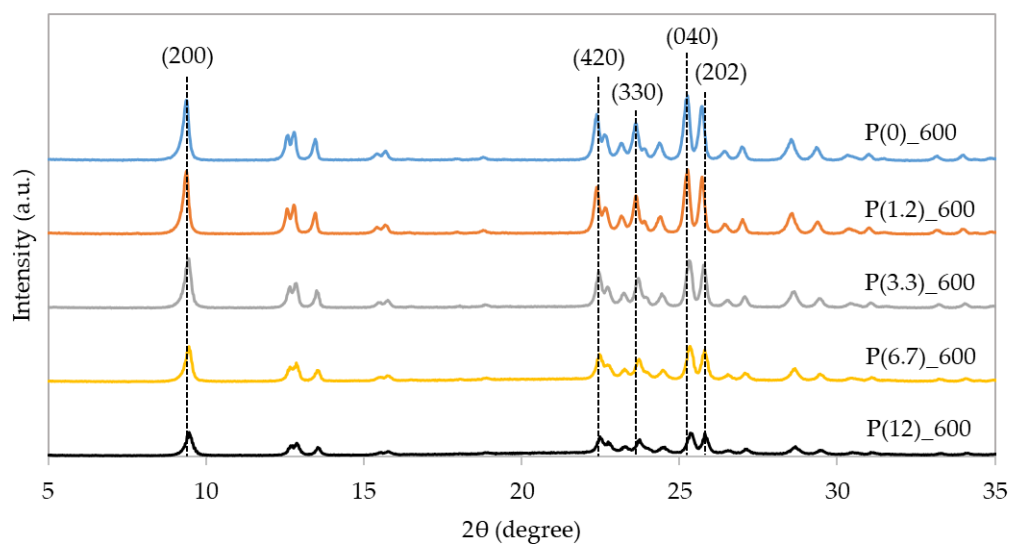


Figure S3. XRD patterns of P-modified ferrierite zeolites calcined at 600 °C.

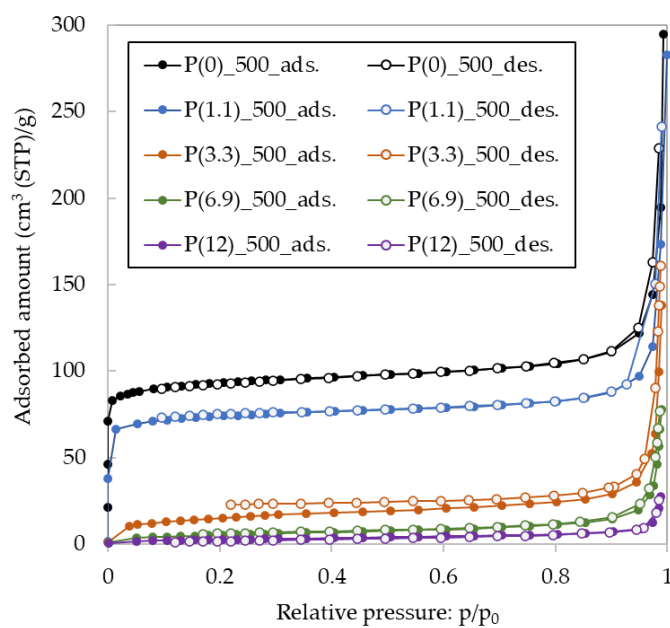


Figure S4. N_2 adsorption-desorption isotherms for P-modified ferrierite zeolites calcined at 500 °C.

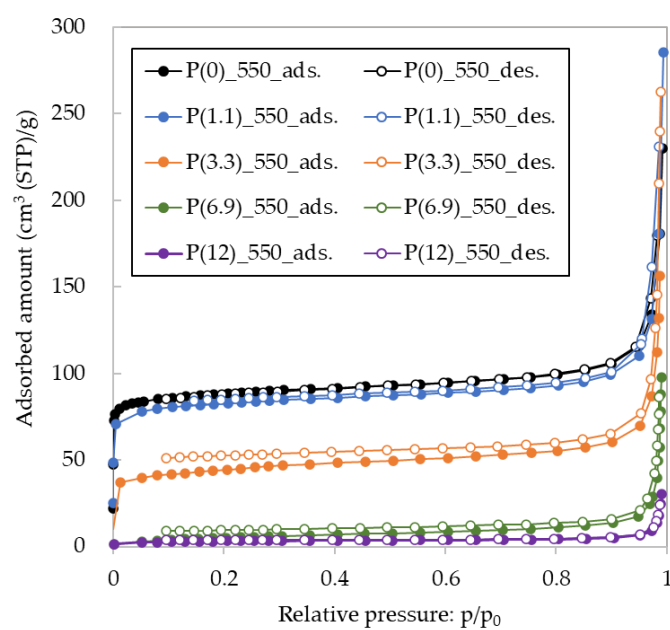


Figure S5. N₂ adsorption-desorption isotherms for P-modified ferrierite zeolites calcined at 550 °C.

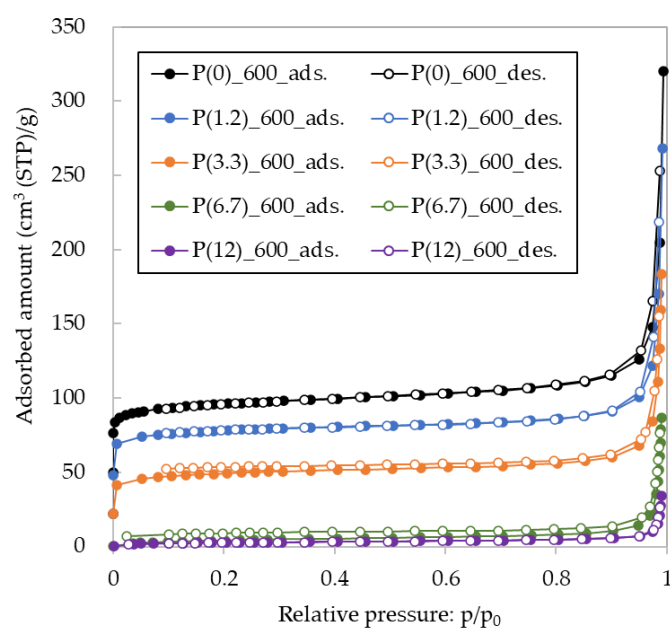


Figure S6. N₂ adsorption-desorption isotherms for P-modified ferrierite zeolites calcined at 600 °C.

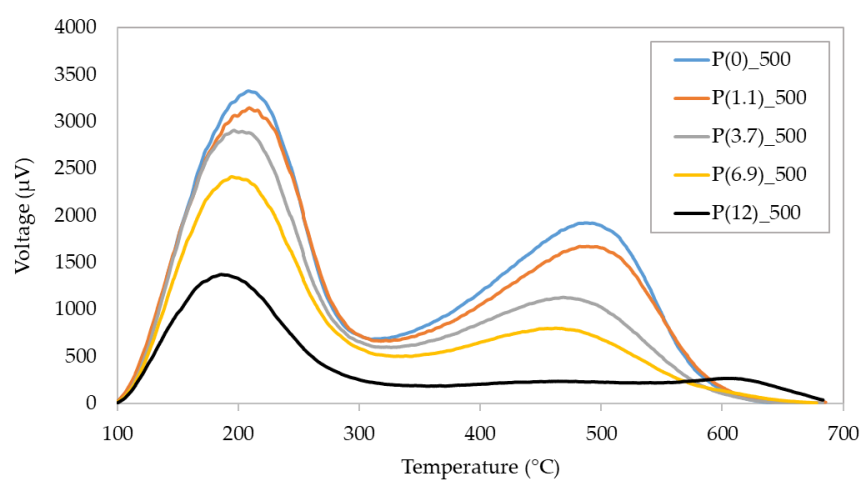


Figure S7. NH₃-TPD profiles for P-modified ferrierite zeolites calcined at 500 °C.

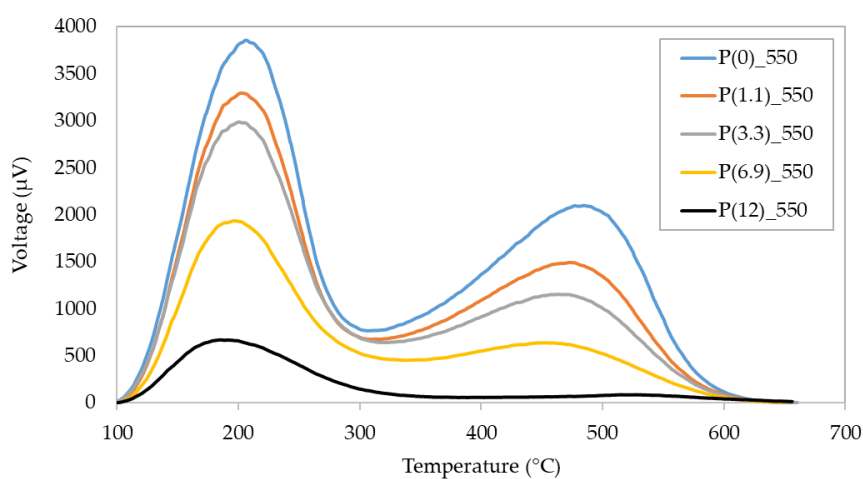


Figure S8. NH₃-TPD profiles for P-modified ferrierite zeolites calcined at 550 °C.

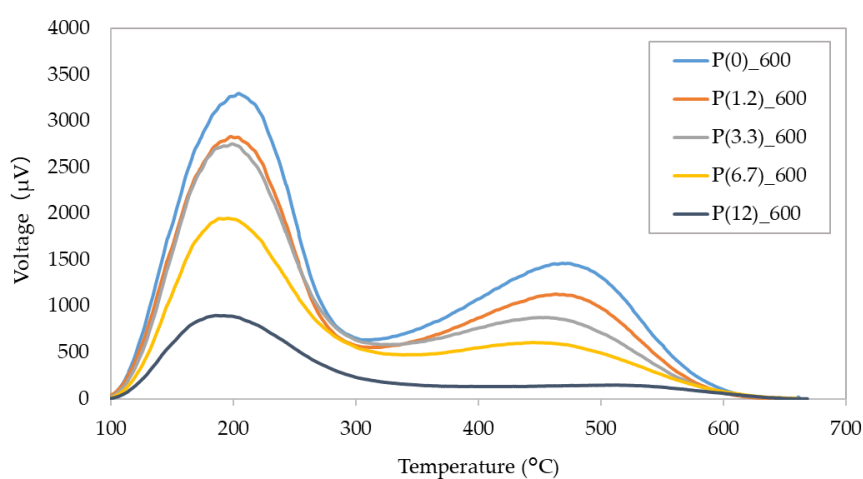


Figure S9. NH₃-TPD profiles for P-modified ferrierite zeolites calcined at 600 °C.

Table S1. Supplementary table for multiple regression analysis.

P-loaded zeolite	Micropore surface area	External surface area	Total pore volume	Micropore volume	Weak acid	Strong acid	<i>n</i> -butene yield
	m ² g ⁻¹	m ² g ⁻¹	cm ³ g ⁻¹	cm ³ g ⁻¹	mmol g ⁻¹	mmol g ⁻¹	C-mol%
	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	y
P(0)_450	352	28	0.37	0.11	1.446	1.428	31.2
P(1.4)_450	339	22	0.27	0.11	1.388	1.303	4.6
P(3.3)_450	168	21	0.20	0.06	1.083	1.02	0.2
P(6.9)_450	13	12	0.11	0.01	0.735	0.833	0.0
P(12)_450	5	5	0.04	0.00	0.536	0.6	0.2
P(0)_500	460	27	0.37	0.14	1.397	1.305	27.8
P(1.1)_500	361	21	0.29	0.11	1.340	1.153	4.5
P(3.7)_500	34	20	0.23	0.02	1.121	0.831	0.3
P(6.9)_500	6	14	0.14	0.00	0.894	0.658	0.0
P(12)_500	4	6	0.05	0.00	0.504	0.379	0.0
P(0)_550	436	27	0.33	0.13	1.449	1.368	29.8
P(1.1)_550	392	25	0.37	0.12	1.235	1.059	2.5
P(3.3)_550	189	24	0.32	0.06	1.097	0.859	0.2
P(6.9)_550	8	11	0.15	0.01	0.633	0.538	0.0
P(12)_550	9	3	0.04	0.00	0.256	0.115	0.0
P(0)_600	474	29	0.38	0.14	1.324	1.027	19.8
P(1.2)_600	383	19	0.35	0.11	1.189	0.893	3.9
P(3.3)_600	229	16	0.28	0.07	1.009	0.733	0.3
P(6.7)_600	6	9	0.13	0.03	0.698	0.592	0.0
P(12)_600	5	4	0.05	0.03	0.328	0.201	0.3
Average	194	17	0.22	0.06	0.983	0.845	6.3
Standard deviation	187	9	0.13	0.05	0.385	0.375	11.0

Correlation coefficients (r_{ij})

X _i \ X _j	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	y
X ₁	1.000						0.706
X ₂	0.860	1.000					0.666
X ₃	0.915	0.946	1.000				0.621
X ₄	0.988	0.847	0.909	1.000			0.700
X ₅	0.869	0.960	0.923	0.856	1.000		0.636
X ₆	0.818	0.906	0.828	0.805	0.956	1.000	0.690
y	0.706	0.666	0.621	0.700	0.636	1.000	1.000