

Effects of Hydrochloric Acid Pretreatment on Different Types of Clay Minerals

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Table S1. Major and minor element concentrations of kaolinite, Na-smectite, Ca-smectite, chlorite and illite samples used in our research, measured by XRF [23].

	LOI (%)	SUM (%)	SiO ₂ (%)	Al ₂ O ₃ (%)	Fe ₂ O ₃ * (%)	CaO (%)	MgO (%)	K ₂ O (%)	Na ₂ O (%)	P ₂ O ₅ (ppm)	TiO ₂ (ppm)	MnO (ppm)	FeO (%)
Kao	14.1	100.053	48.68	35.7	0.39	0.04	0.07	0.31	0.26	1900	2600	30	0.05
Na-Sm	12.11	100.12	58.41	17.48	1.69	1.88	3.17	0.56	4.45	130	1100	310	0.2
Ca-Sm	19.38	100.36	56.7	14.5	2.16	2.68	5.81	0.45	0.1	240	1400	90	0.3
Chl	9.32	100.80	49.85	6.63	2.59	0.59	29.88	0.029	0.16	470	4500	70	1.25
Ill	5.52	99.70	67.86	20.72	0.59	0.1	0.43	3.08	0.39	480	8100	60	0.15

* Fe₂O₃ means full content of Fe.

Table S2. Comparison of the relative element contents testing by ICP-OES and XRF.

XRF	Al (%)	Fe (%)	Ca (%)	Mg (%)	K (%)	Na (%)
Kao	97	1	0	0	1	1
Na-Sm	60	6	6	11	2	15
Ca-Sm	56	8	10	23	2	0
Chl	17	6	1	75	0	0
Ill	82	2	0	2	12	2
ICP-OES	Al (%)	Fe (%)	Ca (%)	Mg (%)	K (%)	Na (%)
Kao	90	4	2	0	1	3
Na-Sm	53	6	8	12	3	18
Ca-Sm	54	9	13	19	3	3
Chl	17	5	3	74	0	2
Ill	71	4	2	2	17	4

Table S3. Clay mineral weight contents of 24 mixed standard samples (Ill, Chl, Sme, and Kao indicate illite, chlorite, smectite, and kaolinite, respectively).

Sample	Ill (%)	Chl (%)	Kao (%)	Sme (%)
Std.8	93	7	0	0
Std.9	60	40	0	0
Std.10	0	3	0	97
Std.11	0	10	0	90
Std.12	0	20	0	80
Std.13	0	0	7	93
Std.14	0	0	62	38
Std.15	0	0	23	77
Std.16	5	11	0	84
Std.17	15	3	0	82
Std.18	30	4	0	66
Std.19	63	12	0	25
Std.20	25	29	0	46

Std.21	9	42	0	49
Std.22	0	0	58	42
Std.23	5	4	62	29
Std.24	24	17	15	44
Std.25	39	11	29	21
Std.26	7	24	13	56
Std.27	10	46	18	26
Std.28	5	3	27	65
Std.29	4	3	9	84
Std.30	5	3	38	54
Std.31	12	8	33	47

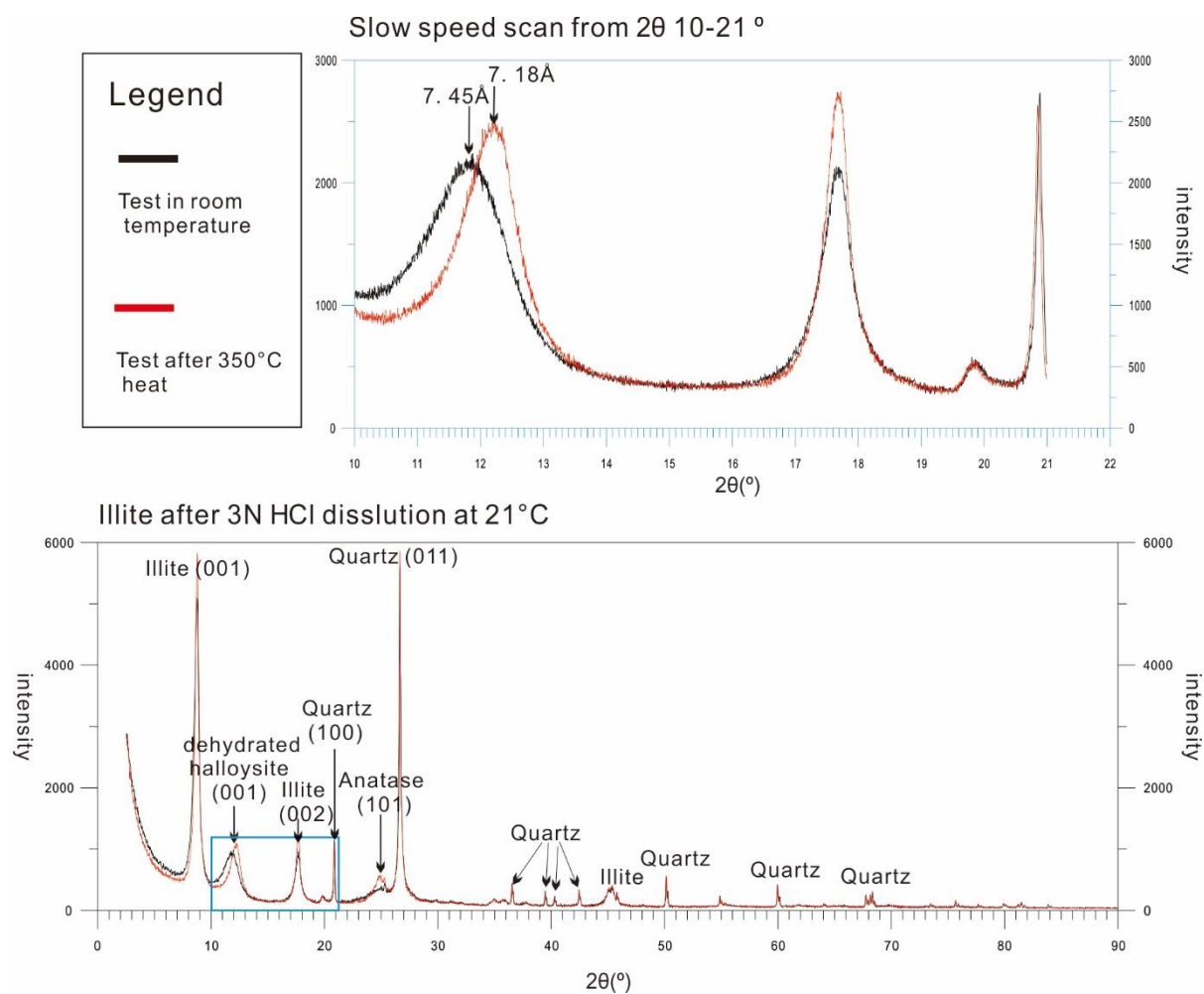


Figure S1. The XRD reflection of illite after 3N HCl dissolution at 21 °C, the black line is testing in room temperature and the red line is testing at 350 °C heat. The blue box circles the slow speed scan range from 10–21° 2θ .