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X-ray Studies of Some Zeolite Minerals

by

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These studies were mainly made by x-ray powder method. X-ray powder diagrams of these minerals were taken with 90mm diameter camera and filtered $Co_{k\alpha}$ and $Cu_{k\alpha}$ radiation.

1. Stilbite from Takigahara, Komatsu city.

A Silicified fossil of elected stamp was found in" green tuff" of a quarry at Takigahara, Komatsu city. The fossil was determined as "*Liquidambar formosana*". Veins of colourless transparent crystals were on the surface of this fossil stamp. Crystals were mainly studied by morphological and x-ray powder methods.

Results of goniometry of these crystals with Goldschmidt's two-circle goniometer are as follows : (010), (001), (110), (101).

Cleavages are perfect to (010). optical index of refraction is about 1.494. Table I and Fig. I show x-ray powder spacings of this mineral. The mineral was determined as stilbite.

2. Laumontite and analcite from Futamatashinmachi, Kanazawa city. There are many cavities in two pyroxene andesite dyke, which intrude into gneiss and rhyolite at Futamatashinmachi in Kanazawa city. In these cavities there are crystals of zeolites and calcite. One of these zeolites is sp. gr. 2. 34. Table II and Fig. II show the x-ray powder spacings of the mineral.

The mineral was determined as laumontite.

The other is sp. gr. 2. 33. Table III and Fig. III show x-ray powder spacings of the mineral. It was determined as analcite.

3. Laumontite from Sabae city.

A Kind of zeolites was kindly presented by Prof. Ichikawa of this institute. X-ray study proved it as laumontite. (Table II and Fig. II).

4. Mordenite from Bodaimachi, Komatsu city.

There are some acid clay ore deposits altered from rhyolitic rock in "green tuff" at Bodaimachi, Komatsu city. This acid clay is consisted of montmorillonite, some α-cristobalite, and a small quantity of pure unknown fibrous mineral. Table IV and Fig. IV show the x-ray powder spacings of this fibrous mineral. It was determined as mordenite.

References

1). Harris, P. G. and Brindley, G. W. (1954), Amer. Min., vol. **39**, 819—824,

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5). Sudo, T., and Hayashi, H., (1956), Kagaku, vol. **26**, 573.

Explanation of Tables and Figures

I : intensity of x-ray powder pattern
ss ; very strong, s ; strong, sm ; strong to middle, m ; middle, mw ; middle to weak, w ; weak, ww ; very weak
d : powder spacings of the minerals

Data of stilbite (Standard) are from references 4).
Data of laumontite (Standard) are from references 2).
Data of analcite (Standard) are from references 3).
Data of mordenite (Standard) are from references 1).

Table I. x-ray powder spacings of stilbite.

stilbite (Takigahara)		stilbite (Standard)	
I	d	I	d
ss	9.07	s	8.9
w	5.26	ww	5.29
sm	4.61	s	4.63
ww	4.23	w	4.25
ss	4.04	ss	4.04
w	3.72	w	3.71
w	3.37	m	3.39
ww	3.16	m	3.16
s	2.99	s	2.99
w	2.76	ww	2.77
		ww	2.68
w	2.55	ww	2.55
ww	2.34	ww	2.03
ww	1.80	ww	1.77
		ww	1.70
		ww	1.67
ww	1.59	ww	1.59
w	1.54	ww	1.55
		ww	1.30

Table II. X-ray powder spacings of laumontite.

laumontite (Futamatashinmachi)		laumontite (Sabae)		laumontite (Standard)	
I	d	I	d	I	d
s	6.85	s	6.85	ss	6.867
w	6.13			w	6.232
m	5.08	w	5.03	m	5.058
w	4.72	w	4.68	s	4.736
w	4.45	w	4.43	m	4.507
ss	4.20	s	4.15	ss	4.172
s	3.65	w	3.62	m	3.669
ss	3.53	s	3.52	ss	3.520
				m	3.363
s	3.32	w	3.32	m	3.276
				m	3.202
sm	3.17	w	3.17	s	3.153
s	3.05	s	3.05	s	3.039
m	2.86	m	2.87	m	2.886
mw	2.76	m	2.76	w	2.801
mw	2.59	w	2.59	m	2.582
m	2.44	s	2.43	m	2.440
ww	2.36			m	2.366
w	2.28			w	2.274
				ww	2.222
w	2.20	w	2.18	w	2.183
m	2.15	w	2.14	m	2.155
ww	2.10			ww	2.092
w	2.01			ww	1.994
w	1.96	w	1.95	w	1.960
w	1.86	m	1.85	ww	1.853

Table III. X-ray powder spacings of analcite.

analcite (Futamatashinmachi)		analcite (Standard)	
I	d	I	d
ss	5.56	ss	5.640
m	4.76	m	4.870
		ww	3.880
		ww	3.814
		w	3.675
ss	3.39	ss	3.424
		m	3.046
s	2.88	s	2.928
		ww	2.812
m	2.65	m	2.696
m	2.47	m	2.506

w	2.40	w	2.428
		ww	2.296
w	2.20	w	2.225
		ww	2.120
m	1.88	w	1.905
w	1.85	w	1.872
		ww	1.836
s	1.73		
w	1.70		
w	1.67		
m	1.58		
w	1.47		
m	1.40		
m	1.35		

Table IV. X-ray powder spacings of mordenite

mordenite (Bodaimachi)		mordenite (Standard)	
I	d	I	d
s	8.97	ss	8.66
m	6.31	ss	6.54
m	5.74	m	5.72
s	4.48	ss	4.50
ss	3.98	ss	3.99
ww	3.44		
s	3.37	ss	3.40
s	3.23	ss	3.15
w	2.86	s	2.90
w	2.69	ww	2.70
w	2.54	m	2.50
ww	2.41	ww	2.43
mw	2.04	w	2.02
mw	1.94	w	1.94
mw	1.80	w	1.855
		w	1.785
mw	1.52	ww	1.527
mw	1.44	m	1.439
mw	1.36	ww	1.376

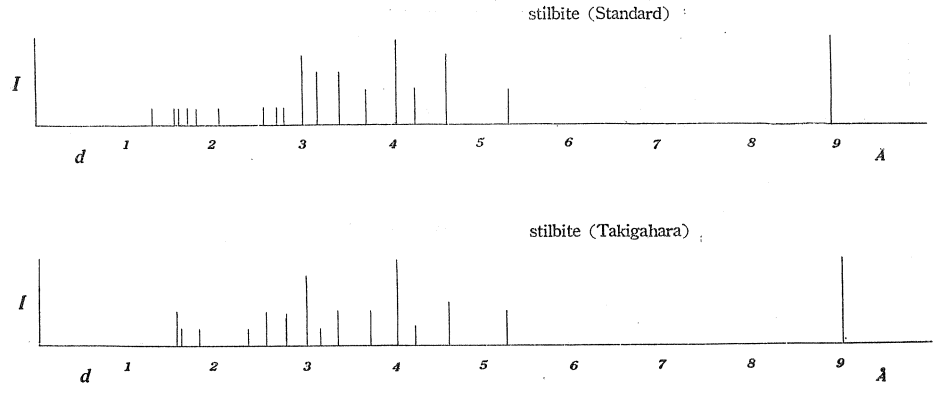
stilbite (Standard)
I
d
1
2
3
4
5
6
7
8
9
Å
stilbite (Takigahara)
I
d
1
2
3
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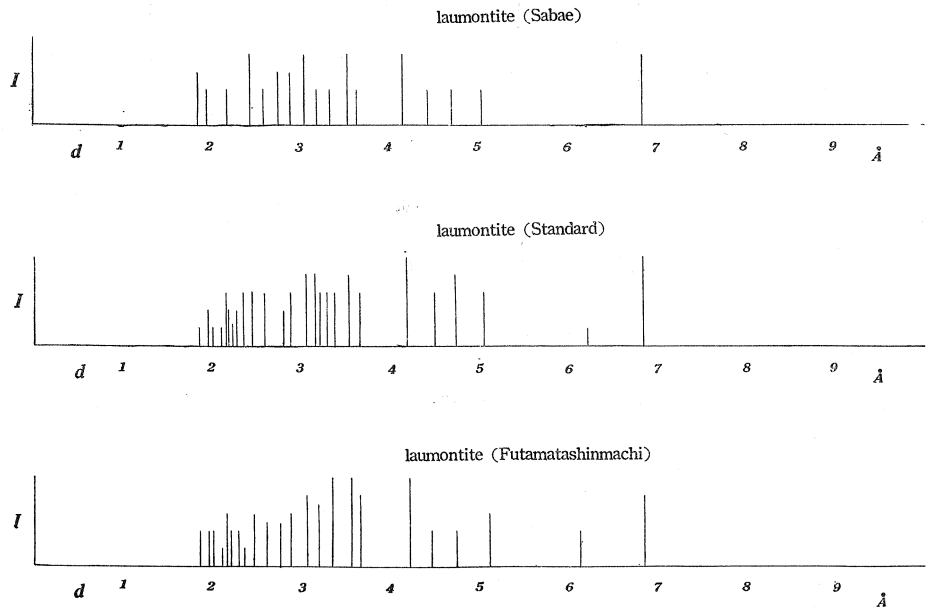
Fig. I.


laumontite (Sabae)
I
d
1
2
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Å
laumontite (Standard)
I
d
1
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laumontite (Futamatashinmachi)
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Fig. II.

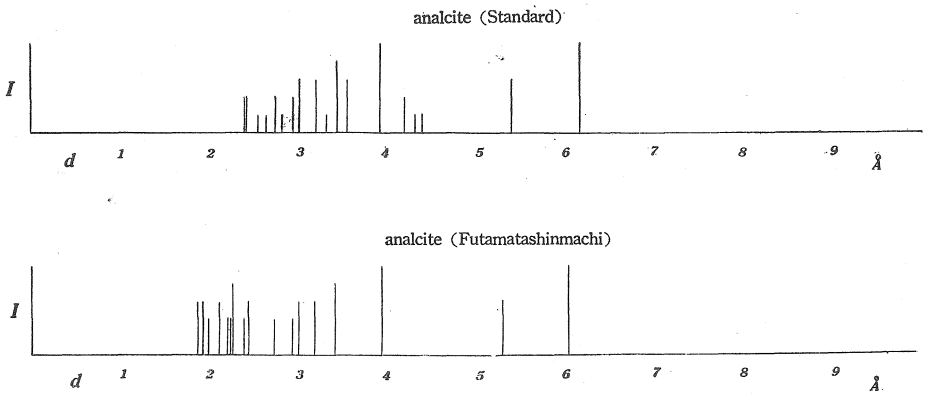

Fig. III.

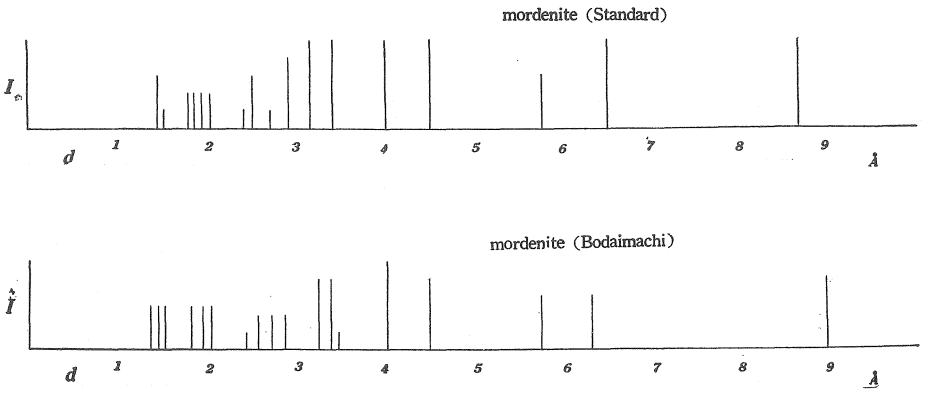

Fig. IV.