

X-Ray Diffraction Pattern of Amino Acid

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(Plates 1-7, Tables 1-3)

Studies on x-ray diffraction pattern of inorganic compounds, clay mineral, rock and mineral have been performed. There are many kinds of organic compounds, and because of their essential nature and properties, x-ray diffraction figures of organic compounds are complicated to compute. The numbers of the values which are recorded on the ASTM card are very few. If the figure and the value of the similar or concerned compounds can be obtained, we may analyze the organic compound qualitatively and quantitatively by the x-ray diffraction pattern. Studies on amino acid have been made biochemically and nutritionally, but only a few have been made by x-ray diffraction.

By finding the basic figure of organic compounds we are able to explain their nature and properties. This figure can be used in connection with the judgement or management of the quality of any material which contains such organic compounds.

The process used was as follows: Many kinds of amino acid, chemical reagents of superior quality, and of seasoning were pulverized, sifted through 300 mesh sieve, and used as the sample.

The condition of our study was as follows:

Philips Target Cu,	Chart speed 2 mm/min.,
Scanning speed 2°/min. (2 θ /min.),	
Divergence slit 1°,	Scatter slit 1°,
Receiving slit 0.2mm,	Voltage 30 KVP,
Current 5-10 mA,	Scale factor 32,
Multiplier 1,	Time constant 2 sec.

REFERENCES

- 1) Guide of X-Ray Analysis, 1963. Rigakudenki Tosho Shuppansha.
- 2) Data of X-Ray Analysis, 1963. Rigakudenki Tosho Shuppansha.

Table 1

L-Ala		DL-Val		DL-Phe		DL-Try		DL-Ser		L-CySH HCl	
dÅ	I/I _o	dÅ	I/I _o	dÅ	I/I _o	dÅ	I/I _o	dÅ	I/I _o	dÅ	I/I _o
6.19	10	12.44	10	15.77	100	18.78	130	6.86	20	4.89	250
5.43	30	11.33	100	5.24	40	9.40	30	5.71	20	4.81	50
5.27	10	5.60	20	5.15	30	6.23	100	5.15	170	4.26	100
4.79	10	5.10	10	5.03	20	4.89	80	4.60	40	4.03	50
4.33	100	4.72	5	4.90	20	4.66	70	4.23	30	3.98	100
3.98	10	4.69	6	4.82	20	4.57	40	4.15	100	3.65	100
3.36	10	4.64	7	4.33	30	4.28	40	4.07	30	3.61	50
3.10	20	4.17	7	4.19	10	4.14	20	3.74	40	3.42	50
2.94	10	4.13	7	4.04	30	4.09	30	3.42	20	3.25	150
2.91	10	4.09	7	3.93	50	3.83	50	3.26	30	3.19	80
2.75	10	3.77	10	3.59	10	3.67	60	3.06	60	2.96	80
2.70	30	3.45	8	3.35	20	3.60	20	2.95	30	2.90	30
2.61	10	2.79	30	3.26	10	3.36	60	2.94	30	2.87	150
2.41	5	2.70	7	3.13	20	3.25	30	2.93	30	2.79	100
2.25	5	2.69	7	2.71	10	3.10	10	2.75	50	2.75	50
2.13	4	2.23	7	2.60	20	2.89	20	2.63	20	2.72	80
						2.76	10	2.58	30	2.59	50
						2.66	20	2.49	40	2.54	50
						2.58	10	2.39	10	2.40	30
						2.46	10	2.32	10	2.39	50
						2.29	10	2.25	20	2.34	30
						1.90	10	2.24	20	2.30	30
								2.17	20	2.19	30

Table 2

L-Cys		L-Asp		L-Glu		L-Asp (NH ₃)		L-His HCl		L-Arg HCl	
dÅ	I/I _o	dÅ	I/I _o	dÅ	I/I _o	dÅ	I/I _o	dÅ	I/I _o	dÅ	I/I _o
4.72	100	7.56	40	8.66	90	7.56	30	7.69	30	10.04	10
4.48	10	5.12	40	6.46	30	5.47	10	6.28	5	6.86	10
4.35	10	4.11	100	4.98	30	5.06	30	5.82	7	5.34	20
4.23	20	3.91	50	4.46	70	4.92	100	5.15	7	5.01	50
4.07	20	3.83	30	4.33	100	4.87	40	4.48	3	4.74	10
3.48	20	3.75	100	4.15	120	4.52	30	4.25	8	4.60	20
3.34	20	3.50	50	4.04	100	4.07	10	4.11	3	4.53	30
3.20	40	3.42	40	3.86	40	3.78	10	3.81	100	4.41	30
3.13	190	3.31	30	3.75	50	3.53	40	3.74	20	4.27	50
3.07	40	3.17	70	3.69	30	3.40	10	3.53	10	4.21	30
2.70	40	3.00	10	3.49	90	3.22	10	3.36	20	3.86	20
2.60	50	2.88	60	3.42	70	3.14	70	3.14	5	3.83	10
2.35	20	2.78	20	3.32	20	3.07	80	3.03	7	3.69	20
2.30	10	2.60	30	3.23	40	2.96	10	2.96	3	3.53	50
2.14	10	2.55	30	3.10	40	2.87	10	2.73	5	3.48	60
2.03	10	2.50	20	2.98	70	2.75	20	2.68	8	3.32	100
		2.41	60	2.88	90	2.72	30	2.56	5	3.15	20
		2.35	30	2.85	30	2.70	10	2.40	4	3.01	20
		2.28	40	2.71	40	2.63	20	2.30	4	2.72	10
		2.23	10	2.66	70	2.53	20			2.69	10
		2.18	10	2.58	30	2.45	20			2.66	20
		2.07	10	2.52	70	2.30	20			2.63	10
		2.05	10	2.48	30	2.25	10			2.54	20
				2.45	20	2.13	10			2.51	10
				2.37	30	2.11	10			2.47	10
				2.33	30					2.41	20

Table 3

Ajinomoto		Ajinosekai		Asahiaji		Mitasu		Yamasa Furēbu		Haimi		Ino-ichiban	
dÅ	I/I _o	dÅ	I/I _o	dÅ	I/I _o	dÅ	I/I _o	dÅ	I/I _o	dÅ	I/I _o	dÅ	I/I _o
9.02	10	9.02	10	9.11	10	9.11	20	9.11	20	9.02	10	9.11	20
7.69	10	7.69	20	7.69	10	7.69	20	7.75	10	7.69	10	7.75	20
5.82	30	5.82	30	5.82	30	5.86	30	5.82	30	5.82	10	5.86	30
5.60	10	5.60	10	5.60	10	5.64	30	5.60	10	5.60	10	5.64	20
5.03	10	5.03	20	5.03	20	5.06	30	5.03	20	5.03	10	5.03	20
4.92	10	4.92	20	4.92	10	4.92	20	4.92	20	4.92	10	4.92	20
4.53	60	4.53	60	4.53	70	4.55	100	4.53	70	4.53	60	4.53	100
4.44	50	4.44	80	4.44	80	4.46	80	4.44	80	4.44	40	4.44	80
4.37	30	4.37	40	4.37	40	4.39	60	4.37	40	4.37	30	4.37	50
4.25	10	4.23	10	4.23	10					4.29	10		
4.04	20	4.04	30	4.04	30	4.04	50	4.04	30	4.04	30	4.04	40
3.93	20	3.95	20	3.95	20	3.97	30	3.95	20	3.95	10	3.95	30
3.88	20	3.88	30	3.88	20	3.90	30	3.88	30	3.88	30	3.88	30
3.80	70	3.81	90	3.81	90	3.83	90	3.81	90	3.81	70	3.81	90
3.74	40	3.74	40	3.74	40	3.75	40	3.74	40	3.74	40	3.74	40
3.60	30	3.60	30	3.60	30	3.62	40	3.60	30	3.60	30	3.62	40
3.50	100	3.50	100	3.52	100	3.53	100	3.52	100	3.52	100	3.49	100
3.48	20	3.48	20	3.48	20	3.48	30	3.48	20	3.48	10	3.48	30
3.41	20	3.41	20	3.41	20	3.42	30	3.41	20	3.41	10	3.41	30
3.36	20	3.37	20	3.37	20	3.39	30	3.37	20	3.37	10	3.37	20
3.22	30	3.21	40	3.22	30	3.23	40	3.21	30	3.22	30		
3.18	50	3.18	60	3.18	50	3.20	80	3.18	50	3.18	50	3.18	80
3.10	20	3.10	20	3.10	20	3.11	40	3.11	20	3.11	10	3.11	40
2.97	20	2.97	20	2.97	20	2.97	30	2.97	20	2.97	20	2.97	30
2.91	30					2.95	30	2.94	20	2.93	10	2.94	20
2.88	30	2.88	30	2.88	40	2.89	50	2.89	30	2.88	30	2.88	50
2.81	20	2.80	20	2.81	20	2.82	30	2.81	20	2.81	10	2.81	30
2.78	10	2.79	10	2.79	10					2.79	10		
2.65	10	2.65	20	2.65	10	2.62	40	2.64	20	2.65	10	2.65	20
2.61	30	2.62	30	2.61	30			2.61	30	2.61	30	2.62	40
2.60	20	2.60	30	2.60	20	2.60	40	2.60	30	2.60	30	2.60	40
2.56	10	2.56	10	2.56	10	2.57	20	2.56	10	2.56	10		
2.52	10	2.52	10	2.52	20	2.53	20	2.53	20	2.53	10	2.53	20
2.49	20	2.49	30	2.49	30	2.50	40	2.49	20	2.49	30	2.49	20
2.45	20	2.44	20	2.45	20	2.45	30	2.45	20	2.45	20	2.45	30
2.35	30	2.35	20	2.35	20	2.36	30	2.36	20	2.37	10	2.36	20
2.30	20	2.30	20	2.30	20	2.30	30	2.30	30	2.30	10	2.30	30
2.26	10	2.26	20	2.26	20	2.26	30	2.26	20	2.26	10	2.26	30
2.24	30	2.24	30	2.24	20	2.24	40	2.24	30	2.23	10	2.24	30
2.20	10	2.20	20	2.20	10	2.20	30	2.20	20	2.20	10	2.20	20
2.17	30	2.17	30	2.17	30	2.17	50	2.17	30	2.17	30	2.17	50
2.12	10	2.12	10	2.12	10					2.12	10		
2.05	10	2.06	10	2.06	10	2.06	20	2.06	10	2.06	10	2.06	20

アミノ酸のX線回折

池田 実・坪田 順一・松村 敬子

X線回折による研究は、今日まで無機化合物、粘土鉱物、岩石鉱物などにおいて多く行われている。有機化合物はその数夥しく、また本来の性質から回折図形が複雑になることが多く、ASTMカードに集録されている数値の数も極めて少ない。しかし同族化合物、関連化合物について基準となる図形や数値が求められているならば、無機化合物と同様に定性分析を、さらに図形の回折によって定量分析を行なうことができる。したがって有機化合物のX線回折による基礎的図形作製はその有機化合物を含有する製品の品質管理や鑑定に資するところが大きいといえる。本実験は数種のアミノ酸のX線回折を行ない基礎的図形を作製すると共に、アミノ酸を含有する調味料の回折図形について検討したものである。

EXPLANATION OF PLATES

Plate 1.

- Fig. 1. L-Alanine
- Fig. 2. DL-Valine

Plate 2.

- Fig. 3. DL-Phenylalanine
- Fig. 4. DL-Tryptophane

Plate 3.

- Fig. 5. DL-Serine
- Fig. 6. L-Cysteine chloride
- Fig. 7. L-Cystine

Plate 4.

- Fig. 8. L-Aspartic acid
- Fig. 9. L-Glutamic acid
- Fig. 10. L-Asparagine

Plate 5.

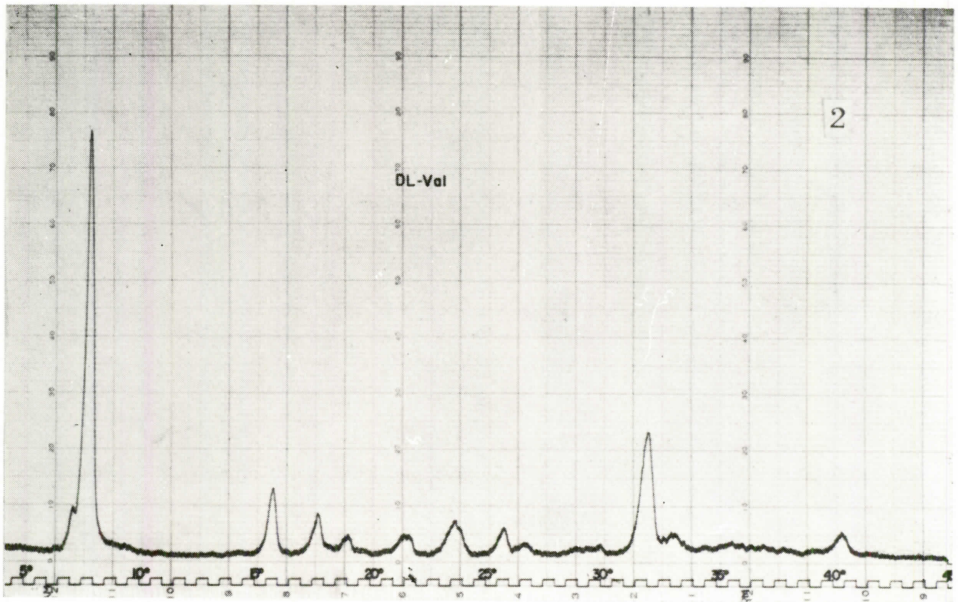
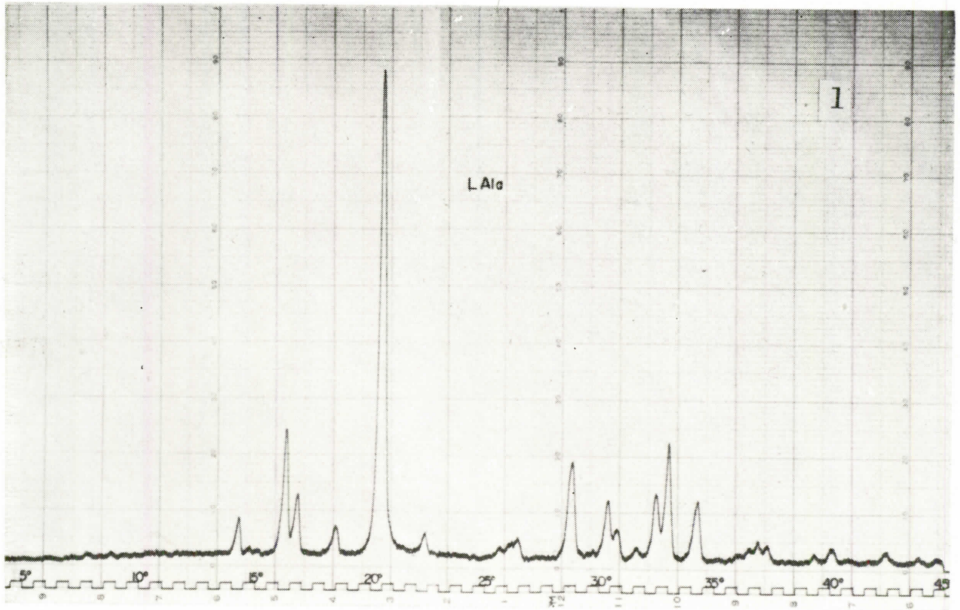
- Fig. 11. L-Histidine chloride
- Fig. 12. L-Arginine chloride

Plate 6.

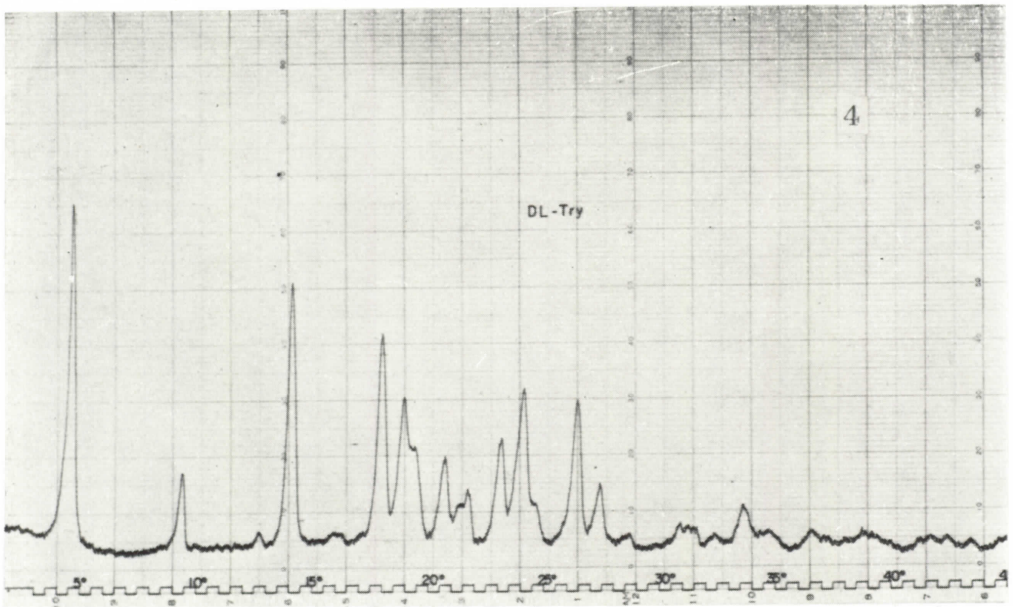
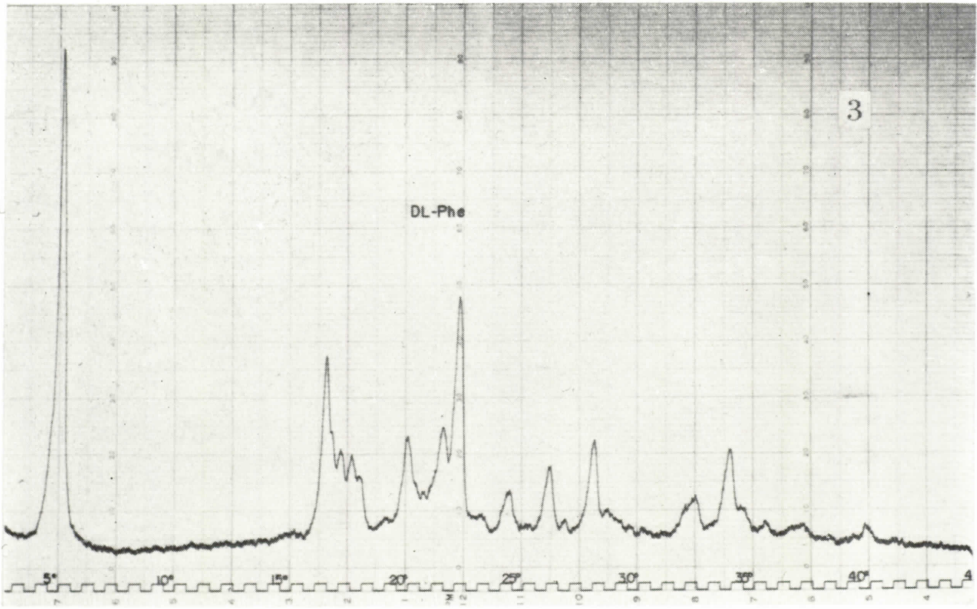
- Fig. 13. Ajinomoto
- Fig. 14. Ajinosekai
- Fig. 15. Asahiaji

Plate 7.

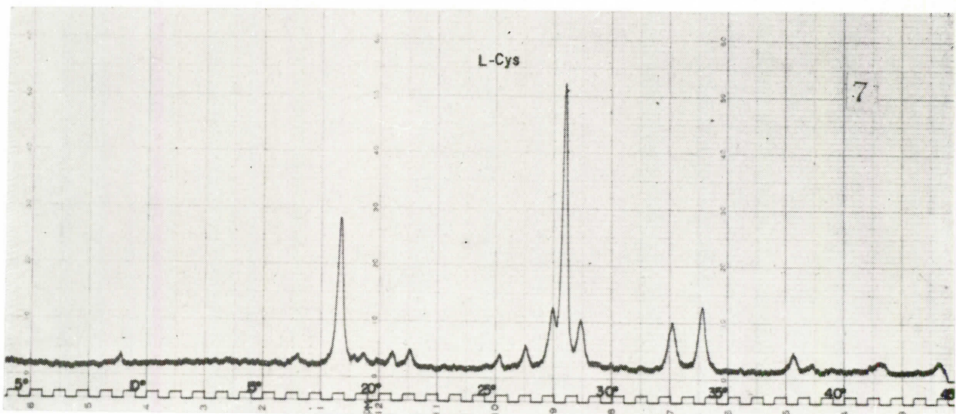
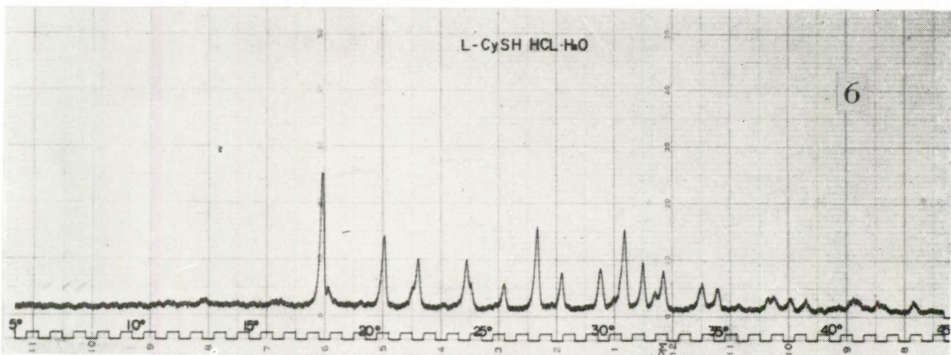
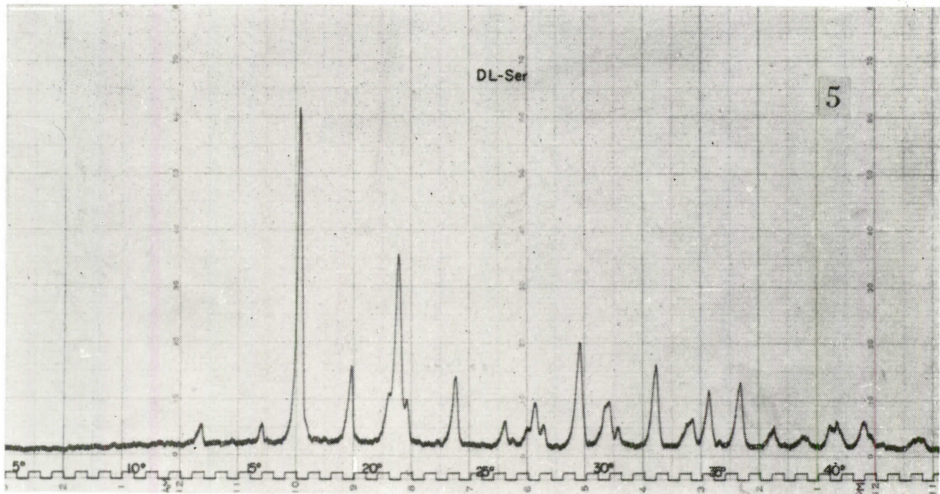
- Fig. 16. Mitasu
- Fig. 17. Yamasa Furêbu
- Fig. 18. Hai-mi
- Fig. 19. Ino-ichiban

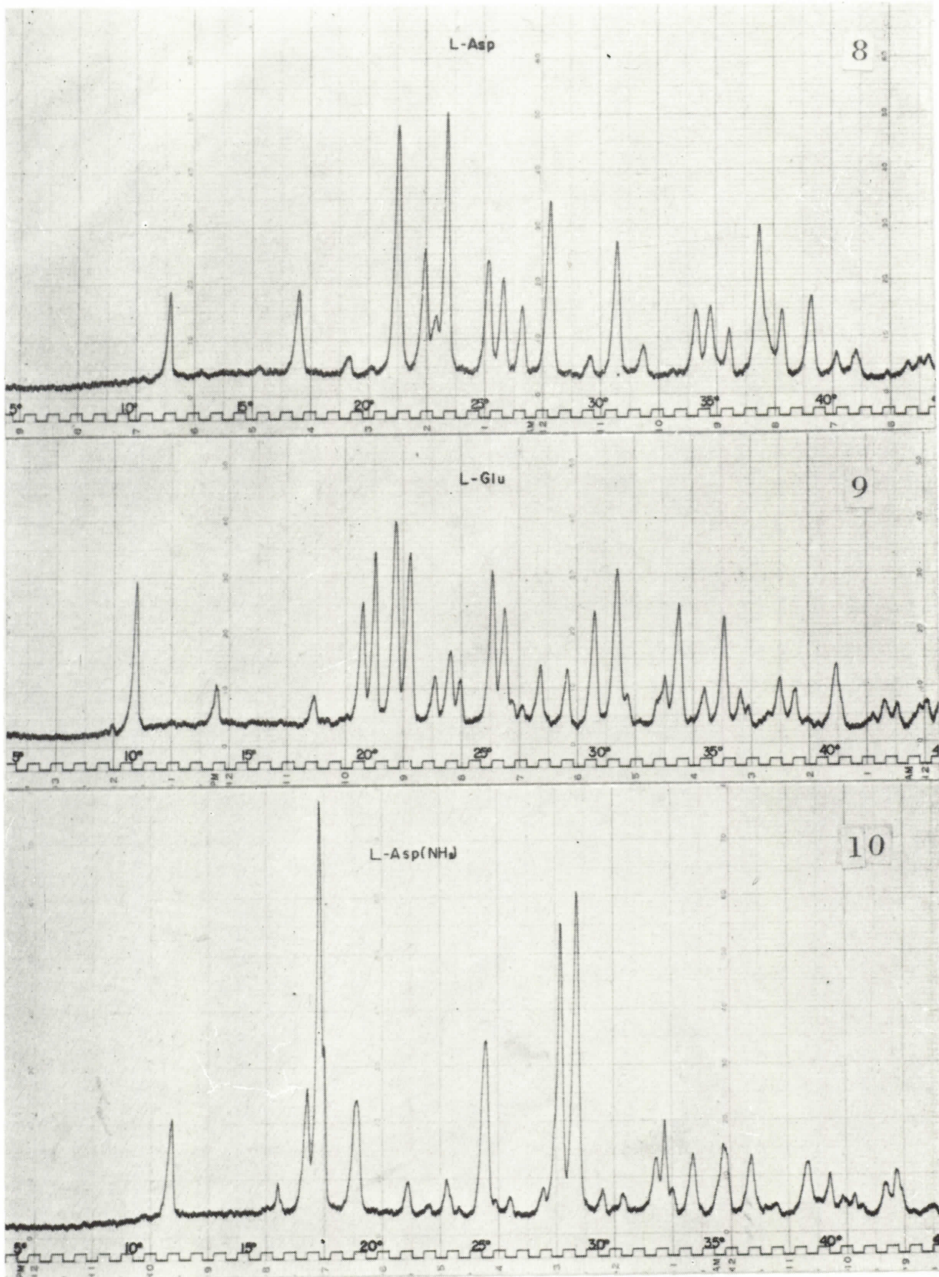


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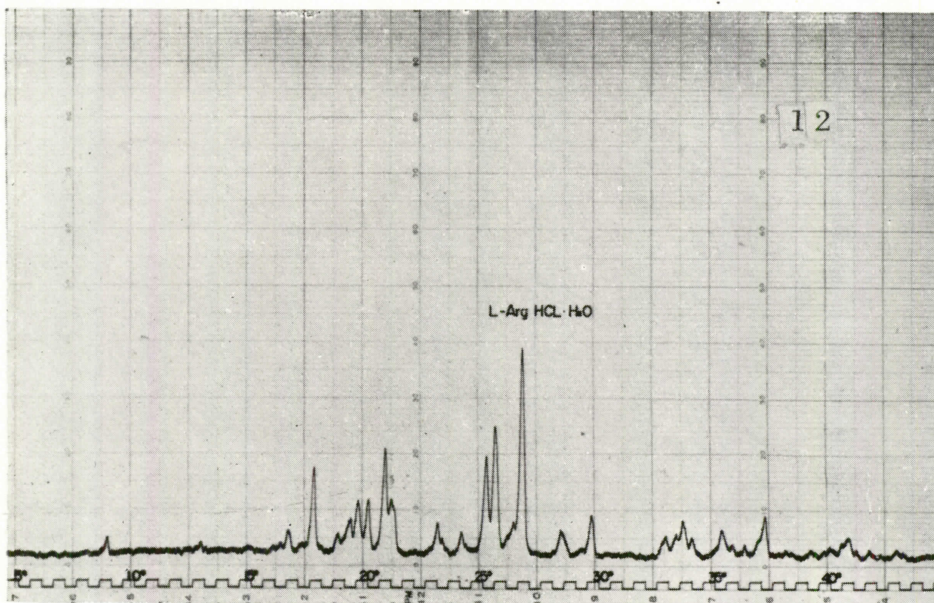
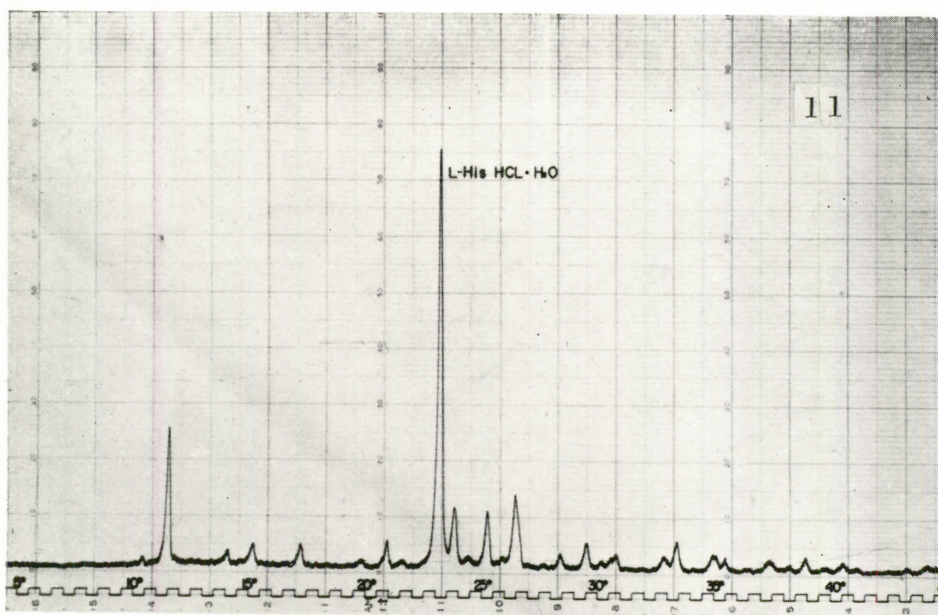


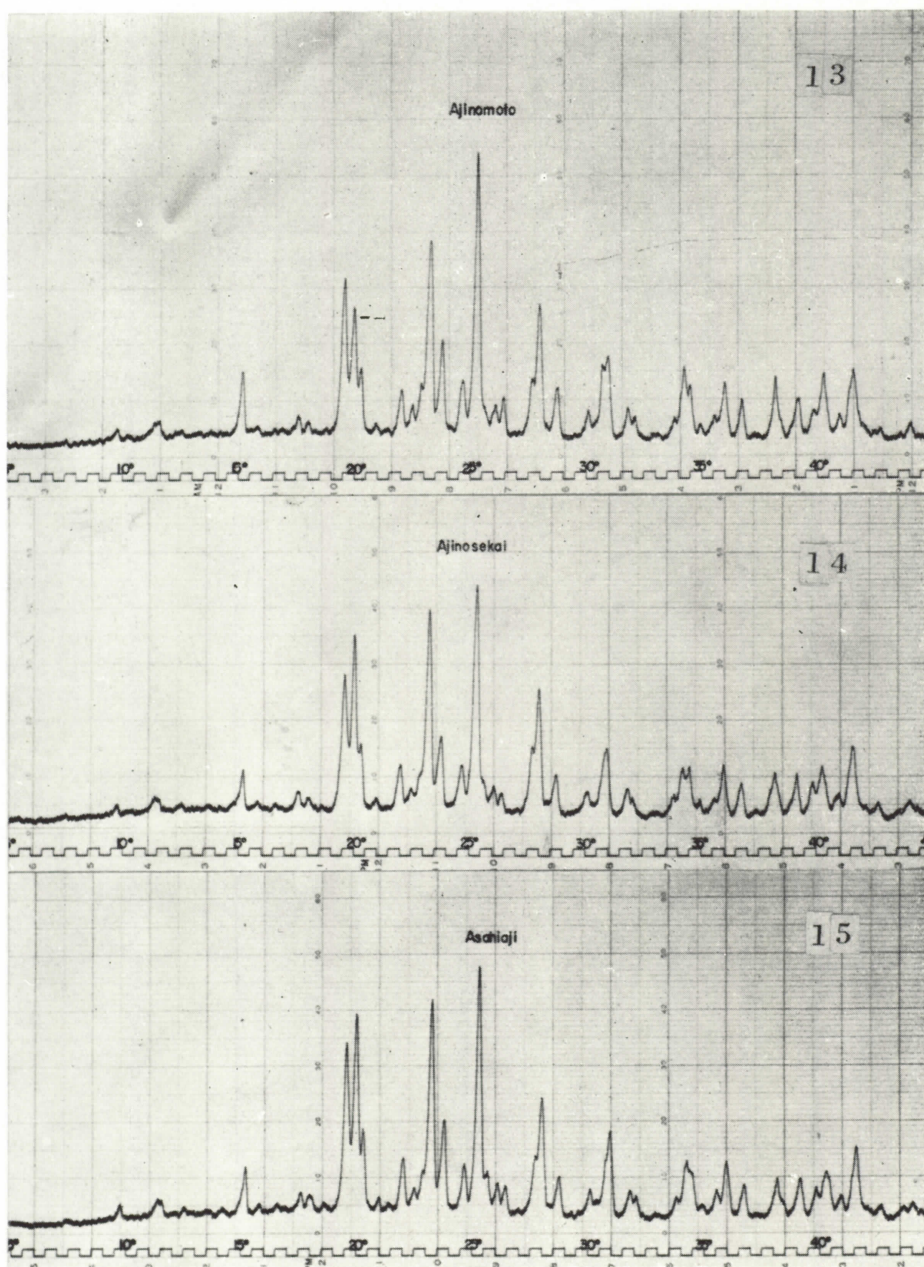
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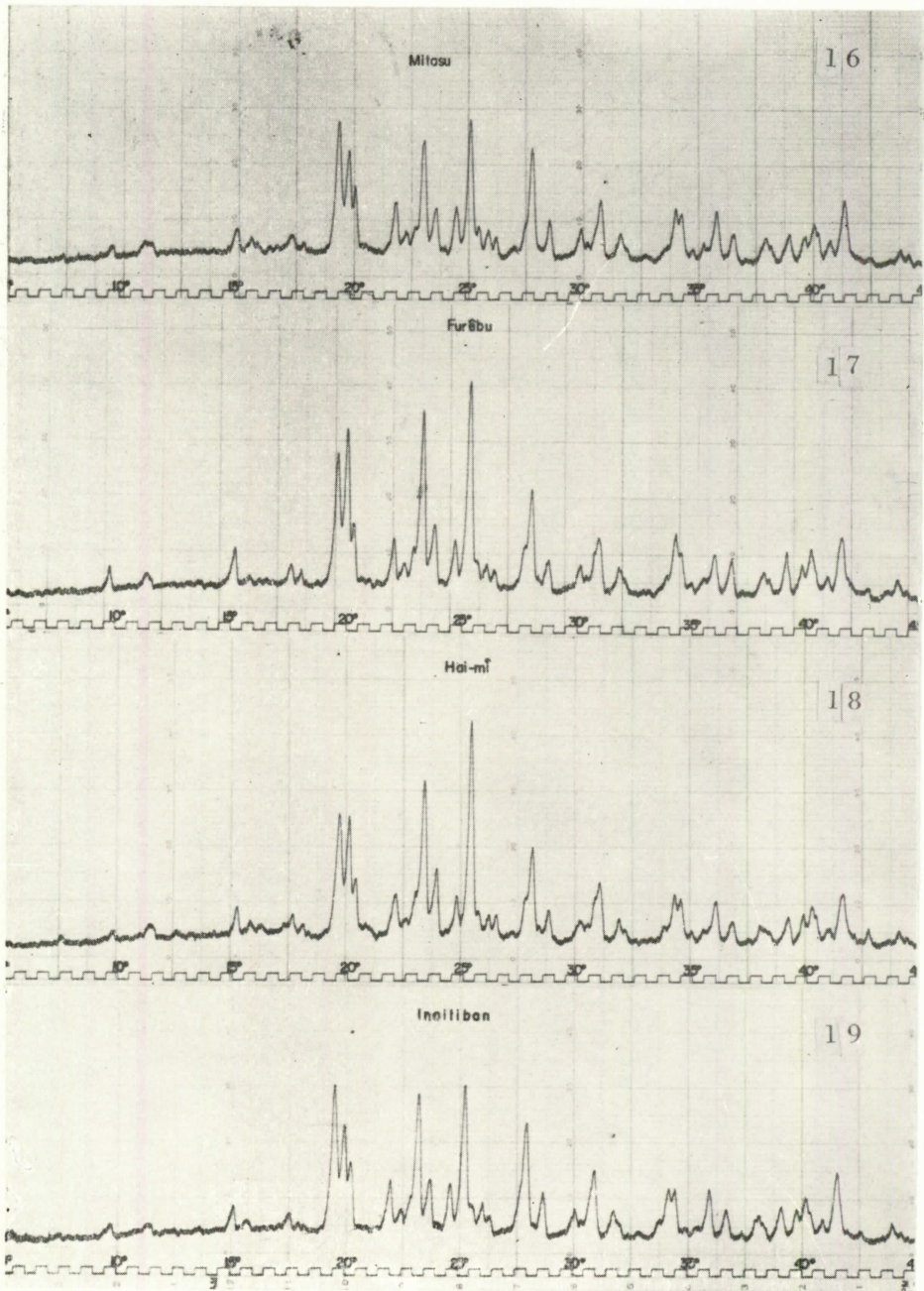


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