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NOTES

A SIMPLE DEVICE FOR SMEARING CLAY-ON-GLASS SLIDES FOR QUANTITATIVE X-RAY DIFFRACTION STUDIES

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Techniques for preparation of clay specimens for quantitative X-ray diffraction studies have been discussed by numerous writers. Gibbs (1965) evaluated seven common mounting techniques and showed that smear-on-glass slide, suction-on-ceramic tile and partially-oriented powder press are acceptable techniques in order of preference. The writer has been using the smear-on-glass slide technique for quantitative analysis of clay minerals since the Gibbs study was published. Uniform thickness and smoothness of the clay film on the slide, however, can not be controlled. Furthermore, it is time consuming to prepare several clay slides of the same sample. This note describes a simple and inexpensive device for preparation of clay slides for quantitive diffraction studies. By using this device, not only can uniform thickness and smoothness of the clay film be obtained, but also frustration and loss of time can be avoided.

The device is constructed from a 195 × 120 × 20 mm aluminum block. It is designed for holding five petrographic glass slides (46 × 25 × 1·25 mm). A standard biological glass slide (76 × 25 × 1·25 mm) is used for smearing the clay paste. Construction of the device is shown in Fig. 1.

The device can be used to smear one to five slides at the same time. The clay paste is transferred to the outer edge of the first petrographic slide. Then the long edge of a biological slide is used to smear the paste over the petrographic slide(s). The thickness of the clay paste on the slide is about 0·15 mm.

The material used for testing the technique was a mixture of montmorillonite (API H-32), kaolinite (API H-5), and illite (API H-35). Fifty grams of room-dried clays were put into 600 ml flask with 200 ml distilled water and shaken

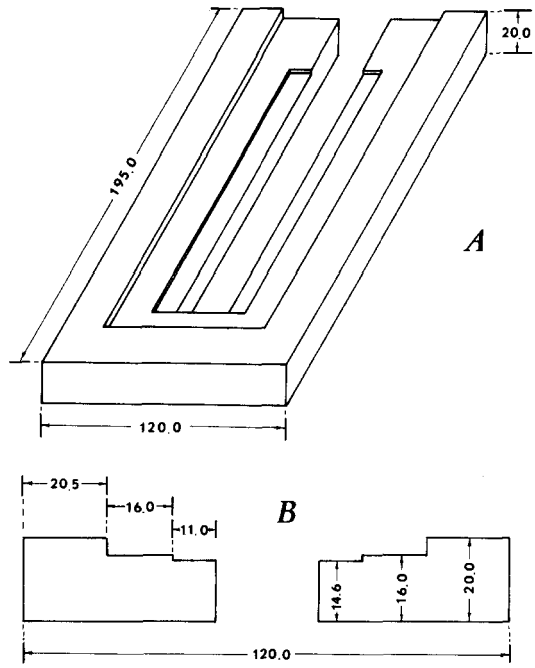


Fig. 1. The construction of the device. (A) Plain view; (B) cross-section. All the measurements of the dimensions in mm.

Table 1. Comparison of the precision of the two smear techniques for X-ray diffraction analysis

	Sample prepared by use of a spatula						Sample prepared by use of the device					
	Mont.		Ill.		Kaol.		Mont.		Ill.		Kaol.	
Slide no.	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S
1	81·6	5·98	29·6	2·07	67·8	4·76	82·2	1·92	35·0	1·58	76·2	1·92
2	82·4	6·47	31·6	3·65	69·4	8·26	87·6	2·70	33·8	3·03	76·2	2·77
3	92·8	7·63	34·4	2·07	74·4	6·95	78·8	2·59	33·8	1·10	66·4	2·70
4	90·2	2·49	33·0	1·22	76·4	6·84	76·2	2·95	31·6	0·89	67·4	1·14
5	86·6	2·88	32·6	2·88	71·0	5·15	80·4	3·36	34·8	2·77	76·4	0·55
$\bar{X}$*	86·7		32·24		71·8		81·04		33·8		72·52	
S†	4·85		1·79		3·55		4·28		1·35		5·14	

* Mean intensity of 5 runs; S: S.D. of 5 runs; $\bar{X}$: mean intensity of 5 sample slides.

† S.D. of 5 sample slides.

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gently for 8 hr on a wrist-action shaker. The clay–water suspension was then transferred to a 1000 ml graduate by adding distilled water to make the total volume 1000 ml. The $<2\,\mu$m fractions were obtained by washing the clay through a porcelain candle filter, and then settling the dispersed clay–water suspension for 8 hr and decanting according to Stokes' law. The $<2\,\mu$m fractions of the clay–water suspension were transferred to a 600 ml beaker and concentrated by use of a porcelain candle filter. In general, 50 g of sample yield enough $<2\,\mu$m fraction of clay for smearing five slides. More than 50 g of sample may be required if a low percentage of clays is present.

This technique has been compared with that suggested by Gibbs (1965). The reproducibilities have been checked by running each of the five clay slides five times under the same conditions. Standard deviations of the mean intensities of the first basal reflections of the above three clay minerals are evaluated. The results show acceptable precision as shown on Table 1.

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