

A SIMPLIFIED NEW SUCTION APPARATUS FOR THE PREPARATION OF
SMALL-SIZE POROUS PLATE CLAY SPECIMENS FOR X-RAY DIFFRACTION

J.R.M. Huting and L.P. van Reeuwijk



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The mounting of oriented clay specimens for X-ray diffraction analysis can be done in several ways, e.g. by smearing a clay paste onto a glass slide, by drying a clay suspension on a glass slide or by sedimentation from a suspension on a porous plate by suction (Gibbs, 1965; Tien, 1974). The latter technique has proven to be very rapid and convenient and the quality of the specimens produced in this way compares well with that of other techniques (Gibbs, 1965). Procedures for the porous plate technique have been described by several authors: Kinter and Diamond (1956), Dummler and Schroeder (1965), Rich (1969), Shaw (1972), Van Reeuwijk (1979) and LaManna and Bowers (1985). The procedure by Van Reeuwijk is the only one developed for the preparation of small-size specimens to be used in automatic sample changers such as the Philips PW 1170. Although the suction apparatus used in this procedure is relatively uncomplicated, we have successfully used a still simpler device derived from the bottom section of the previous one. Any workshop that has the disposal of a lathe could manufacture the apparatus. As the previous one, the apparatus can be made to accept porous plates of other sizes than those indicated here.

THE APPARATUS

A cross-section of the device is shown in Figure 1. It consists of a PVC platform in which a rectangular recess is fraised to accept porous plates of 18 x 14 x 1.9 mm. The platform is connected to a 2 litre vacuum erlenmeyer by a hollow stem fitted into a perforated rubber stopper (see Figure 2). The bottom of the recess is fitted with a rectangular rubber washer ensuring a water-tight seal when the water-soaked porous plate is pulled down by suction. The upper part of the recess is fraised into a funnel-shape to obtain a larger reservoir (ca. 5 ml) and to facilitate easy placing and removing of the porous plate with tweezers or a spatula.

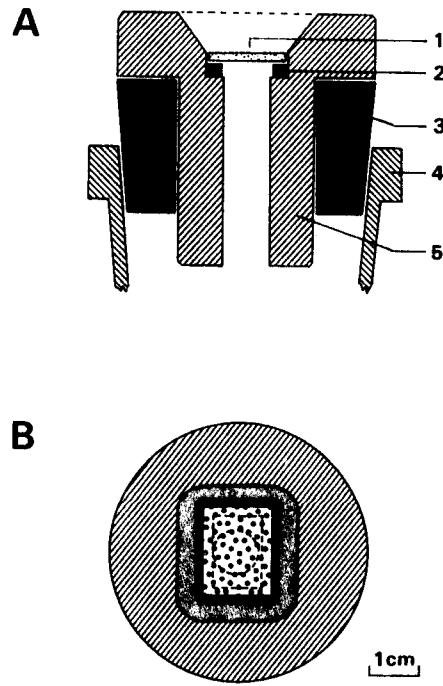


Fig. 1. Drawing of suction device. A. Vertical cross-section.
1. Porous plate. 2. Rubber or neoprene washer. 3. Perforated rubber stopper. 4. Rim of vacuum flask. 5. Stem. B. View from above.

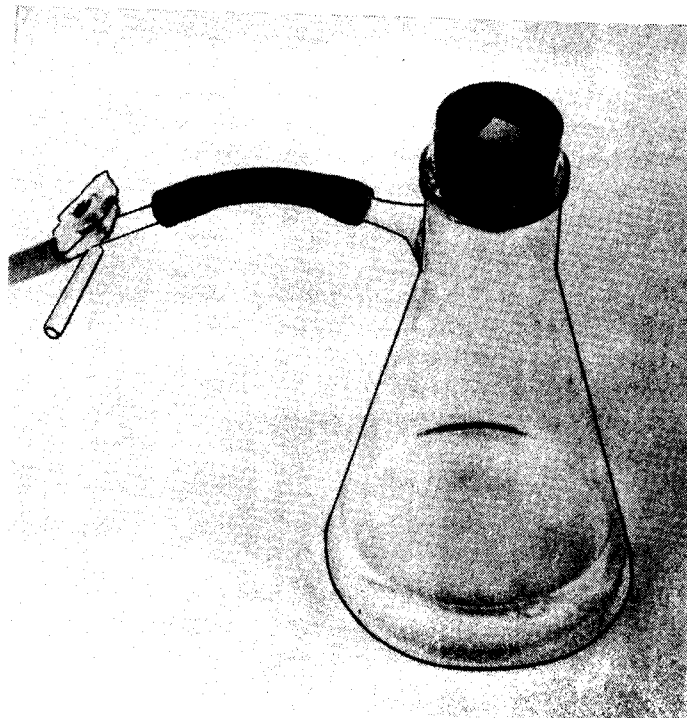


Fig. 2. Photograph of complete unit connected to vacuum line.

SPECIMEN PREPARATION

The specimen preparation has been described earlier (Van Reeuwijk, 1979) but will be briefly repeated here. A clay suspension containing about 10 mg clay is poured onto the porous plate after suction is applied (e.g. 5 ml of a 0.2% suspension). Although the amount is not critical, experience has shown that more clay does not significantly increase peak intensities and may induce cracking and scrolling of the clay layer upon drying and especially upon heating. If the concentration of the suspension is not known, a useful aid in routine work is to dilute a suspension in a test tube (diam. 15 mm) until a fluorescent lamp of the laboratory lighting becomes just visible through it as a narrow bright line; 5 ml of this suspension usually yields a satisfactory specimen. The quality of the specimen can be inspected without removing it from the suction apparatus and in case the clay layer appears to be too thin, some more suspension can be added.

PREPARATION OF POROUS PLATES

For the manufacture of porous plates, two materials have proved suitable: the white unglazed non-vitreous ceramic wall tile obtainable from almost any tile factory, and "Diapor M8G" available¹⁾ in plates of various sizes and 5 mm thick and consisting essentially of mullite. These materials differ in some respects. Unglazed tile is much harder and, therefore, has a longer life in repeated use. It has a more pitted surface however, and is somewhat less permeable than "Diapor". Both have excellent heating properties. Cleaning for re-use can be done by soaking the plates in a 0.1 molar solution of sodium pyrophosphate or in an other dispersing agent, followed by rinsing.

The small plates can be prepared similar to thin sections of rock specimens or of impregnated soil samples. If prepared by hand, plates or tiles must be cut to a working size (e.g. 54 x 42 mm, sufficient for 6 small plates), they are then ground to the desired thickness, scored with a sharp object and the small plates snapped apart.

With a flat-grinding machine, preparation is much quicker since larger units can be handled (e.g. sufficient for 40 small plates).

¹⁾ made by Schumacher Fabrik, Bietigheim/Wurttemberg, Fed. Rep. of Germany

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