MODERATELY LOW ANGLE MEASUREMENTS
WITH A 9.0 CM POWDER CAMERA

By G. BROWN and G. C. DIBLEY
Rothamsted Experimental Station, Harpenden

[Read 4th November, 1955]

ABSTRACT

A method of adapting a 9.0 cm X-ray camera is described.

Although scattering in the region 20-100 Å cannot be called low angle scatter there are many clay mineral investigations in which clear recording of this region is required. We have found that 9.0 cm diameter powder cameras based on the design of the 19.0 cm camera described by Bradley, Lipson, and Petch (1941) can be modified to recorded spacings in this region. The cameras we normally use are modified as suggested by MacEwan (1949) and have a punched slot in the film with a locating peg instead of the more usual beam catcher. To eliminate air scatter at low angles the cameras are usually evacuated. For some investigations it is not desirable to evacuate the camera and in these cases a beam catcher is more useful. In this note a modification of the 9.0 cm camera is described which allows either a beam catcher or the punched slot method to be used with the same camera. The locating peg and the beam catcher are easily interchangeable and so also are beam catchers of different sizes. There is a fine adjustment which allows the beam catcher or the locating peg to be adjusted accurately and quickly. With a beam catcher 0.5 mm wide, at a distance of 2 cm from the specimen, spacings up to 80 Å can be clearly recorded with Co Kα radiation and there would be no great difficulty in extending this to somewhat lower angles. The short specimen to film distance, 4.5 cm, and the facilities for evacuation which the camera already provides are further useful attributes.

The beam is collimated by a double slit system both sets of which are adjustable. The first slit is on the film ring and the second slit is as near the specimen as possible. This arrangement combined with a foreshortened view of the focus gives narrow well-collimated beams.

The beam catcher or the locating peg for the punched film are carried by a plate which rests on the top plate of the camera and which pivots about the conical specimen holder bearing. This plate has a fine adjustment and two locking screws. The beam catcher or locating peg is carried in a radial rectangular slot in the plate which
lies along the beam axis and is thus capable of fine adjustment by adjusting the plate. The beam catcher projects through a larger rectangular hole in the top plate of the camera. The beam catcher, which for measurements involving low angle scattering only is merely a strip of metal 0.5 × 3 mm in cross section, is soldered to an inverted T-shaped block which fixes into the rectangular slot in the adjustable plate. Fig. 1 shows plan and elevation of the upper flange of the camera. The beam catcher is fixed into the slot as close to the specimen as is practicable and adjusted first optically and finally with the X-ray beam. The locating peg for the punched film which may be used as an alternative in routine clay mineral identifications, also fits into the slot and projects through the upper flange of the film ring.

FIG. 1—(a) Plan view of camera with adjustable plate. (b) Front elevation of camera looking towards X-ray source. The inverted T-shaped block is shown in black and the hole through which the locating peg projects is also shown in black.

REFERENCES