not the mean of the values for affluent and effluent air, as Decker assumed.

If Decker's values for CO_2 concentration are corrected, the data appear as graphed in Fig. 1. Extrapolation of the lines shows a CO_2 compensation point of about 0.14 mg/lit (0.007 percent), thus agreeing closely with the values in No. 10 and 11 of Table 1. The initial CO_2 content of air in Decker's experiments averaged about 0.54 mg/lit. The bracket above the abscissa indicates the range of values for CO_2 compensation point appearing in the literature.

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Simple Method of Measuring Opaque Objects

Ozalid plan copying paper provides a simple, inexpensive method of measuring and recording dimensions and shapes of appropriate-sized nontransparent objects. No special equipment is needed other than concentrated ammonia and unexposed Ozalid paper.

An object to be measured is placed on unexposed paper and illuminated so that a sharp, dark shadow falls on the paper surface. After a few seconds to a few minutes, depending on the paper speed and light wavelength and intensity, lighted parts of the paper are bleached. The paper is then "developed" with ammonia fumes in the tank shown in Fig. 1.

Other light-sensitive materials have been used to reproduce true-scale silhouettes, but Ozalid paper is most satisfactory in several respects. Its slow light-reaction, compared with photographic materials, simplifies exposure-timing and permits handling and development in subdued light. However, it does not require the long exposures with intense illumination needed for blueprint paper. Its easy dry development minimizes shrinkage and distortion.

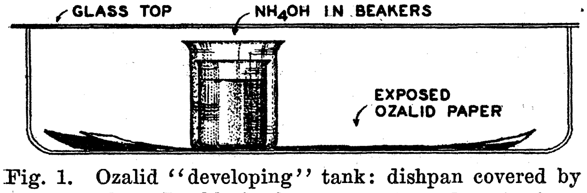
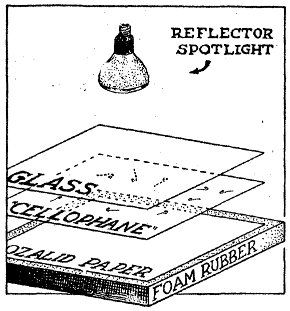


Fig. 1. Ozalid "developing" tank: dishpan covered by pane of glass. Double beakers prevent condensate from staining paper. With fresh concentrated ammonia (28 percent NH_3), latent shadow-image is developed in 5 min. Overdevelopment is impossible.

Versatility of direct-exposure methods using Ozalid paper is well illustrated by the widely different techniques that we used to solve the following specific problems.



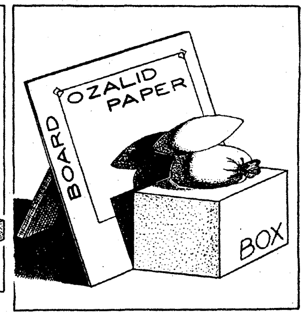


Fig. 2 (left). Expanded diagrammatic setup for silhouetting radish seedlings on Ozalid paper; 3 min exposure to No. 2 reflector photoflood lamp 5 ft above paper. Fig. 3 (right). Setup for silhouetting stream pothole "grinder" on Ozalid paper; 15 sec exposure to bright sunlight.

Schreiber's problem was to measure lengths of radish seedlings. (R. K. Schulz, Department of Soils, University of California, Berkeley, previously solved a similar problem by exposing seedlings on blueprint paper.) For each experiment, 45 seedlings had to be measured accurately and rapidly. In subdued light, seedlings were taken from soil, washed, and placed on waterproof cellophane over foam rubber (Fig. 2). Blotted, the seedlings were then weighted with a pane of glass to assure close contact and sharp shadows. Ozalid paper was inserted between the cellophane and foam rubber and was exposed. After development, the silhouettes were measured and filed for reference and comparison.

Higgins' problem was to make a scale cross-sectional drawing of a discus-shaped, 6-in. stream pothole "grinder." The drawing was traced from a sharp, life-sized Ozalid image obtained in the following manner. The grinder was placed on a sandbag (Fig. 3) so that the sun's shadow bisected the grinder and fell on a board placed perpendicular to the sun's rays. Ozalid paper, in a protective cardboard sandwich, was exposed to the shadow by removal of the upper cardboard for 15 sec.

These illustrations should suggest many possible applications of Ozalid direct-exposure methods to a great variety of problems involving measurements of opaque objects.

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