A SIMPLE METHOD OF DEMONSTRATING COLLOIDAL PARTICLES.*

BY GEORGE H. NEEDHAM.

As more chemists should have the opportunity of examining colloidal particles under the microscope, and as the study of these particles is becoming more and more important, a simple method of demonstrating the coarser colloidal particles with the Abbe condenser universally supplied with microscopes should be of practical value. The following method is offered:

APPARATUS.

(*a*) Compound microscope with a 4-mm. objective and a × 20 compensating eyepiece, giving a magnification of about × 800.

(*b*) A black stop of cardboard or metal used in the stop carrier of the Abbe condenser, 22 mm. in diameter. The size may have to be varied to suit the numerical aperture of the objective and the diameter of the back condenser lens. The shape of the stop is shown in Fig. 1, the dimensions given being those found suitable for a Zeiss-Abbe condenser, three-lens type, and Zeiss 4-mm. DD objective.

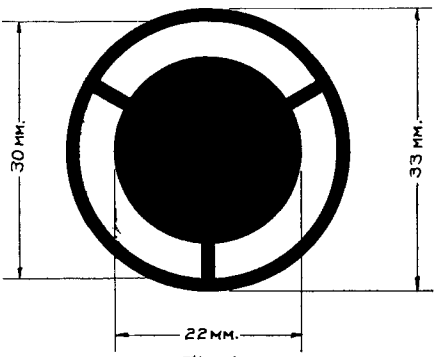

Fig. 1.

(*c*) A Davis Shutter (iris diaphragm) fitted between the objective and nosepiece so as to reduce the numerical aperture of the 4-mm. objective to a point where the sharpest contrast exists between the particles and the dark field. This shutter is not absolutely essential, but it greatly helps in securing a jet black field. As a substitute, instead of having the iris diaphragm of the condenser wide open, it can be closed slightly, but this has the disadvantage of cutting off the light rays of greatest obliquity.

(*d*) A 200-watt concentrated filament Mazda lamp was used. An arc lamp would be better, as the more powerful the source of light, the smaller the particles that can be made visible.

The Abbe condenser must be in immersion contact with the glass slide with a layer of cedar wood oil. The slide used should be a specially selected one as free as possible from flaws and unevenness. The colloidal solution examined should not be more than 1% strength, in a very thin layer between the cover glass and slide, and free from air bubbles.

The several colloidal solutions tried contained particles as small as 100 $\mu\mu$. This method has been found adequate to show the Zsigmondy-Brownian movement, and its simplicity should make it easy to demonstrate this phenomenon in classroom work.

RESEARCH LABORATORIES,
E. R. SQUIBB & SONS,
BROOKLYN, N. Y.

* Read before Scientific Section A. PH. A., Des Moines meeting, 1925.