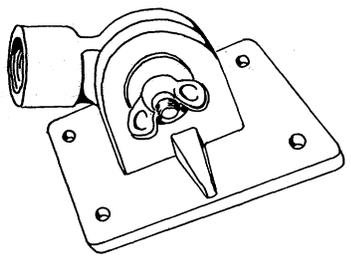

Fig. 2

vanized pipe nipple for 1½-inch pipe fixed in the concrete ceiling of the room when the slab was poured. A suitable length of pipe is attached to this nipple by a sleeve. The pipe screws into the heavy cast iron clamp illustrated in Fig. 2. This clamp (made to our specifications at a local foundry) is fastened by screws through the plate side to the back of the mirror frame. With this type of installation, the mirror is readily adjustable in both horizontal and vertical planes.

Inasmuch as our lantern cannot otherwise be tilted upward sufficiently, we mount it on a small sloped wooden platform. At the resulting angle, the light beam from lantern to mirror is not seen by the audience.

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## Anaerobic Cuvette

Studies of hemoproteins often require measurements of anaerobic reactions in a spectrophotometer. Recently Lazarow and Cooperstein (*1*) described a device that is especially suited for reactions involving catalytic hydrogenation. For some time, a somewhat different apparatus that allows anaerobic titrations, as well as additions from two sidearms, has been used in this laboratory (Johnson Foundation) and is described here because it may be useful for a variety of other studies as well (*2*).

The apparatus consists of two parts: the cuvette proper and a titration head (Fig. 1). The 1-centimeter cuvette fits into a Beckman cellholder. Two sidearms, $B_1$ and $B_2$, hold reagents to be mixed after the system has been gassed. There is a ground glass joint, *C*, between the cuvette and the titration head.

For anaerobic titrations, the sidearms and the burette *F* are left empty (*3*). The apparatus is evacuated and filled with an inert gas repeatedly, using stopcocks *D*. The burette *F* and the tip *G* are then filled through side tube *H* with the help of a two-way stopcock *E*. Titration is started and the drop hanging from the tip is stirred into the solution after each addition. This is accomplished by moving a magnetic flea between positions $K_1$ and $K_2$ with a magnet. In order to make an optical density measurement, the flea is stored in one of the sidearms (position $K_3$). Daylight is excluded from the apparatus with a black cloth.

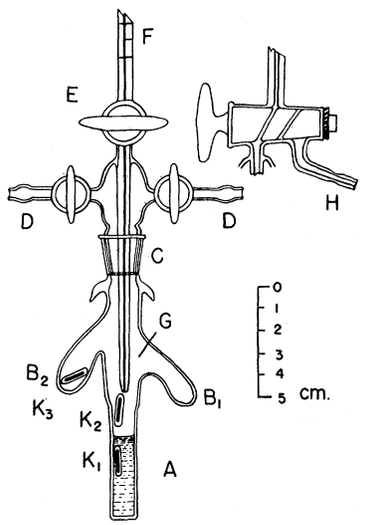


Fig. 1. Vacuum cuvette. Left, front view with upper end of the burette omitted. Right, side view of burette-filling mechanism. $K_1$, $K_2$, $K_3$, alternative positions of a magnetic flea. The other symbols are explained in the text.

If an addition of only one or two reagents is necessary, the titration head is removed and the gassing is performed by a two-way stopcock connected to a ground glass joint that fits into joint *C*. After anaerobic conditions have been obtained, the reagents in the sidearms are tipped in. This technique is essentially that of Ball *et al.* (*4*). Experimental results obtained using this system will be submitted elsewhere for publication.

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### References and Notes

1. A. Lazarow and S. J. Cooperstein, *Science* 120, 674 (1954).
2. This research was supported by a grant from the Division of Grants and Fellowships, National Institutes of Health, U.S. Public Health Service.
3. In some cases, the removal of $O_2$ can be perfected by the presence of some $Na_2S_2O_4$ in one of the sidearms.
4. E. G. Ball, C. F. Strittmatter, O. Cooper, *J. Biol. Chem.* 193, 635 (1951).

2 May 1955

*A great discovery is not a terminus, but an avenue leading to regions hitherto unknown. We climb to the top of the peak, and find that it reveals to us another higher than any we have yet seen and so it goes on. The additions to our knowledge of physics made in a generation do not get smaller or less fundamental or less revolutionary as one generation succeeds another. The sum of our knowledge is not like what mathematicians call a convergent series . . . where the study of a few terms may give the general properties of the whole. Physics corresponds rather to the other type of series called divergent, where the terms which are added one after another do not get smaller and smaller, and where the conclusions we draw from the few terms we know cannot be trusted to be those we should draw if further knowledge were at our disposal.*—J. J. THOMSON.