or with rubber that has been stretched to the degree at which it displays marked resistance to further elongation. The elongation does not occur with unstretched rubber. The effect is not simply a component of the volume changes which occur on stretching or freezing, but is opposite in direction and has at least four times the magnitude which such volume changes would produce. Measurements have not yet been made of the change of volume accompanying the elongation. By analogy with the contraction of stretched rubber on heating, it seems probable that this phenomenon is related to the Gough-Joule effect, and that the increase in length is accompanied by a lateral contraction of such magnitude that the volume decreases.

Available evidence indicates that rubber hydrocarbon consists of very long molecules. When rubber is stretched, these molecules tend to be oriented parallel to the direction of elongation, so that, when freezing begins, a crystalline axis has already been established. The crystals are correspondingly oriented. During freezing a time comes when enough molecules have fallen into crystalline spacing to harden the sample and relieve the stresses that produced stretching. As more molecules move into the crystalline arrangement, the spacings at right angles to the stretch become less, the long directions of the molecules become more strictly parallel to the axis of stretch, and the sample is elongated. This explanation is supported by unpublished evidence regarding crystal growth at approximately – 25° C.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

POTENTIAL MEASUREMENTS IN OXIDO-REDUCTION MIXTURES[1]

IN the series "Studies on Oxidation-Reduction,"[2] Clark has described the apparatus used for potential measurements of oxido-reduction dyes in various ratios of oxidant and reductant. The mounting of the potentiometer and the gas purification being left out of consideration, the principle of this apparatus is briefly the following.

Reductant is sucked out of the reduction vessel into a reservoir. Here the hydrogen gas still present is removed from the reductant by passing nitrogen through it. Now a burette may be filled from the reservoir, so that measured quantities of reductant may be introduced into the electrode vessel. We then found that this apparatus might quite well be simplified, while retaining the principle according to Clark, by leaving out the reservoir and substituting the burette for it. At the same time the number of taps is in this way reduced from 6 to 3, as is apparent from the figure (Fig. 1). During the numerous determinations of oxido-reduction curves executed with this apparatus, it has continually proved to answer the purpose easily. This may justify this short communication.

The apparatus is used in the following manner: Via A, three-forked tap X (T shape) and B the electrode vessel C may be made free from oxygen by passing nitrogen through it. *Via* G and three-forked tap Y the nitrogen may be led through burette D and then either to the electrode vessel (*via* three-forked tap Z with double boring) or to the reduction vessel M, first

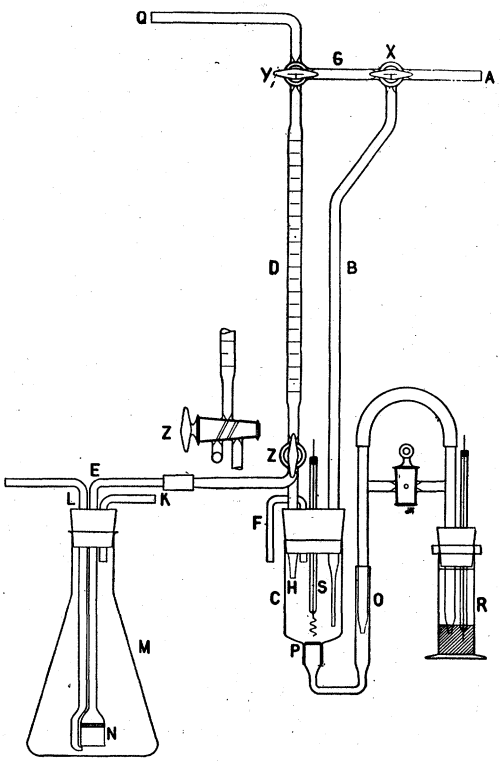

FIG. 1

driving away the oxygen and after reduction the hydrogen. The stream of hydrogen passes to M *via* L. By connecting Q with a water spout air pump, the reductant may directly be sucked into burette D, after being freed from hydrogen in the reduction vessel. This takes place under overpressure of nitrogen in M *via* a tube of communication with L which has not been drawn in the figure. After the burette has been filled,

[1] From the Histological Laboratory of the University of Amsterdam. Director, Professor Dr. G. C. Heringa.

[2] No. 3, pp. 31–36, U. S. Government Printing Office, Washington, 1928.

the stream of nitrogen is again led *via* A to D, so that the vacuum above the reductant is filled with nitrogen. By means of tap Z an accurately measured quantity of reductant may then be added to the oxidant in the electrode vessel. As a rule 9 cc. of the oxidant was brought into the electrode vessel and to this was added 1, 1.25, 1.60, 2.15, 3, 4.5, 7.5, 15 and 45 cc., respectively, of the reductant. Thus the ratios oxidant: reductant were gone through from 9:1 to 1:9. Likewise for the measurement of oxido-reduction curves with solutions of reducing salts this apparatus is very useful.

D. B. KROON

MUSEUM LABELS

REGARDING the suggestion of Professor Tolmachoff in SCIENCE of November 20, concerning an enamel patch and lettering system for museum labels, perhaps a simplified variation may also be of interest. Instead of ordinary gloss enamel, use is made of one of the modern lacquers such as white Duco. This not only has the advantage of rapid drying but has a surface which will take India drawing ink used with a steel pen. The inconvenience of cleaning a brush can be avoided by applying the white finish with a toothpick of the ordinary type which is flat at one end. After a little practice, a patch can thus be made as neatly as with a brush. The average operator will find it a great advantage to be able to do the lettering with a pen instead of a brush. It is even possible to dispense with a stirring paddle by merely keeping the can less than two thirds full and vigorously shaking before each occasion of use. For infrequent but busy occasions, this method of preparing labels is ideal, and during two years of use it has given all the satisfaction that could be desired.

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THE FLAGELLA OF PERANEMA

DUE to the fact that there still remains considerable doubt in the minds of some investigators (Hyman, 1936)[1] concerning the existence of a second flagellum in *Peranema trichophorum,* it seems advisable to suggest a procedure by which this structure in the living organism can be demonstrated.

Korschikow (1924)[2] stated that weak solutions of gentian violet stain would cause the second flagellum, which is adherent to the periplast, to be loosened and to extend away from the cell because of the increase in metabolic movements of the organism. I have used a 0.02 per cent. concentration by weight of this stain and have obtained excellent results by the addition of equal parts of the stain and culture medium on a slide. A cover slip was used and the resultant solution examined at once with a 4 mm objective. The peranemas which come into contact with the stain become very metabolic and, in many cases, after a short interval, the second flagellum is visible projecting from the anterior end of the animal.

Students in protozoology at Ohio State University have used this procedure repeatedly in classroom work and the stain has proved to be effective in approximately half the cases.

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[1] Libbie H. Hyman, *Quart. Jour. of Micros. Sci.,* 79: 43–56.

[2] A. A. Korschikow, *Arch. russ. Protist.,* 3: 148–205.

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