in the afternoon about 3 hours after the noon meal. Patients with fever and organic lesions of the heart were excluded. The results are expressed in cc. of blood per kg. of body weight. The minimum blood volume was 58 cc. per kg. and the maximum, 115 cc., with an average volume of 77.3 cc. The average total blood volume in normal individuals studied with the same method was 66.6 cc. (6)

The blood volume of 14 patients was again determined after their basal metabolism returned to normal following subtotal thyroidectomy. The time between the operation and the determination varied from 10 days to 5 months, and some patients had repeated measurements. On the basis of cc. of blood per kg. of body weight, all but one showed a striking fall in their circulatory volume, the decrease ranging between 6.8 and 28.2%. The percentage decrease in the total volume and in the volume per square meter of surface was approximately of the same magnitude. One patient was followed for a period of one year and 9 months. Her blood volume remained at the same level as that observed soon after operation, about 28% lower than the initial measurement.

Four patients were studied after the administration of Lugol's solution. This treatment seemed to have a definite effect in diminishing the blood volume along with the drop in basal metabolic rate. Following partial removal of the thyroid gland in these patients there was a further decrease in the blood volume.

5021

A New Form of Apparatus for Determination of Gases by Manometric Measurement.

HSIEN WU.

From the Department of Biochemistry, Peiping Union Medical College, Peiping, China.

In the course of a certain study on hemoglobin it was necessary to mix thoroughly the solution to be analysed with the reagent before evacuation and extraction. As this could not be done in Van Slyke's apparatus,[1] we have devised a new form of the gas burette which, besides serving our special purpose, possesses certain advantages over the form now generally used.

The principal feature of the apparatus (Fig. 1) is that 2 cham-

[1] Van Slyke, D. D., and Neill, J. M., *J. Biol. Chem.*, 1924, lxi, 523.

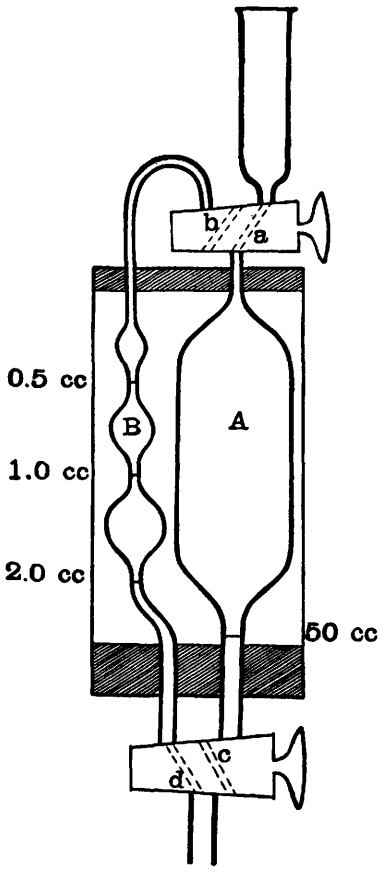

FIG. 1.
A new form of apparatus for determination of gases by manometric measurement.

bers are used instead of one. The extraction is carried out in one chamber (A) while the gas is measured in another (B).

The new apparatus is used essentially in the same way as Van Slyke's. The apparatus is first rinsed with H_2O, and both chambers, including the cock spaces, are completely filled with mercury. The solutions are then introduced into chamber A and the extraction is carried out as usual. On account of the high density of mercury it is desirable to evacuate chamber B also before shaking the apparatus. When the extraction is finished the upper cock is turned to connect A and B. If the pressure in A is high, the mercury in cock space b and above it is pushed over into B. If this does not happen when the cock is opened, shake the apparatus for a few seconds. Mercury is admitted into A and the solution is brought just to the top of A or to a mark slightly above the cock space b—according to how

the chamber B has been graduated. The lower cock is then turned to connect B to the manometer and the reading of the pressure is taken in the usual manner at 2, 1 or 0.5 cc.

By proper manipulation of the cocks and the levelling bulb, the gas is transferred back into A. The gas may now be ejected from this chamber or it may be absorbed with a reagent After the absorption the gas left is again transferred to B for measurement.

The advantages of the new apparatus over the usual form of Van Slyke's are as follows:

1. The gas dissolved in a solution may be completely extracted by repeated extraction in chamber A and storing the gas in chamber B. The total volume of gas thus extracted is measured in one reading. This advantage is important when the coefficient of absorption of the gas in the solvent is unknown.

2. Since no solution is admitted into the measuring chamber, it is always clean and there can be no error in volume measurement on account of precipitates adhering to the wall or on account of improper drainage of solution. Furthermore, the volume of the gas is measured between marks on a capillary tubing, and gas can be measured at 0.5 cc. with practically the same accuracy as at 2.0 cc.

3. The zero (vacuum) reading for the same kind of solution is constant, irrespective of the volume of solution used for extraction, which is not the case in the usual form of Van Slyke's apparatus.

4. In case more than one gas are to be determined by absorption with different reagents, the gas can be stored in chamber B while the solution is rejected from chamber A. If desired, the reagent can be made gas-free by extraction in chamber A. This can be cleaned if necessary after each absorption. Only a minimal amount of the reagent needs to be used and the error due to gases evolved from, or dissolved by, the reagent is thus reduced to the minimum.

5. Without evacuating the chamber, the solution and reagents can be thoroughly mixed in the chamber by gently shaking the apparatus.