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Gasometric Determination of Blood Calcium.

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The calcium is precipitated and washed in a centrifuge tube as in the Kramer-Tisdall method, and is redissolved in 2 cc. of 1 N sulfuric acid. The solution is transferred to the manometric blood-gas apparatus of Van Slyke and Neill,¹ using sufficient water for washing to bring the volume up to 6 cc. Dissolved air and CO₂ are removed by shaking the solution 2 minutes in the evacuated chamber and ejecting the extracted gases. One cc. of 0.1 N potassium permanganate, previously acidified with 1/20 volume of 0.1 N sulfuric acid, to decompose any carbonate present as contamination, is added. The excess permanganate oxidizes the oxalic acid to CO₂. The chamber is evacuated and shaken 3 minutes. The gas pressure p_1 is read on the manometer with the gas volume at 0.5 cc., if the calcium is being determined in a 1 cc. serum sample, at 2 cc. volume if a 3 cc. sample has been used. After reading p_1 the CO₂ is absorbed with 1 cc. of 5 N sodium hydroxide, and p_2 is read with the same gas volume in the chamber. The pressure due to the CO₂ from the oxalate is $p_1 - p_2 - c$, where c is the value of $p_1 - p_2$ determined in a control analysis of the reagents. The CO₂ in millimols is estimated from Table III of Van Slyke and Neill. If a 1 cc. sample of serum is used, the factor in the column for "Sample = 2 cc., $s = 7.0$, $a = 2.0$, $i = 1.014$ " is multiplied by $2 \times 1.03/1.014 \times 2.0/0.5 = 0.508$, to obtain the factor giving milliequivalents of Ca per liter; since in the present analysis the sample is $\frac{1}{2}$ as much, i is changed to 1.03, and a is changed from 2.0 to 0.5, only s being the same as on the table. To calculate milligrams of calcium per 100 cc. of serum, the factor in the above mentioned column of Van Slyke and Neill is multiplied by $2 \times 0.508 = 1.016$, since 1 milliequivalent of Ca per liter is 20 mg. per 1000 cc., or 2 mg. per 100 cc. A sample with 0.1 mg. of Ca (the amount in 1 cc. of normal plasma) gives at 20° a pressure reading of 154 millimeters, which can be duplicated within 1 mm. The error is about 1/5 as great as in the permanganate titration of the same amount of calcium.

¹ Van Slyke, D. D., and Neill, J. M., *J. Biol. Chem.*, 1924, lxi, 523-73.