

which picrolonates were prepared, after each being given the solubility of the picrolonate in grams per 100 c.c. of water at 20°–23°, and the melting point. The picrolonates are arranged in order of solubility. *Dl-phenyl-alanine*, 0.12, 212° (decomp.); *Tyrosine*, 0.29, blackens at 260°; *l-phenyl-alanine*, 0.34, 208°; *dl-leucine*, 0.53, indefinite above 140°; *l-leucine*, 0.55, indefinite at about 150°; *d-isoleucine*, 0.58, 170°; *dl-valine*, 0.81, indefinite above 150°; *dl-serine*, 0.98, decomposed 265°; *glycocoll*, 0.99, 214°; *dl-alanine*, 1.01, 216°; *d-valine*, 1.20, 180°; *d-alanine*, 1.61, 214°; *dl-aspartic acid*, 1.69, blackens at 130°; *dl-glutaminic acid*, 2.37, 194°.

Nearly all the picrolonates decompose more or less on melting, and the melting points are not sharp. L-Phenyl-alanine picrolonate is much more soluble in alcohol than the racemic salt, and can be separated from most of the racemic substance by solution in alcohol. The optically active compound has a sp. rotation in absolute alcohol of + 30°. The specific rotation of d-isoleucine picrolonate in alcohol is + 33.3°. Phenyl-alanine can be separated from glutaminic or aspartic acid by dissolving the mixture with enough picrolonic acid to combine with the phenyl-alanine only. The picrolonate of the latter crystallizes pure. It is probable that other amino acids can be separated by similar use of picrolonic acid. The pyrrolidine acids, proline and oxyproline, do not readily yield picrolonates when treated as described above.

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An improved apparatus for gasometric determination of amino nitrogen.

By **DONALD D. VAN SLYKE.**

[From the Rockefeller Institute for Medical Research, New York.]

The apparatus differs from that reported at the meeting of this society in December, 1909, in that: (1) The desamidizing bottle with stopper holding the 10 c.c. burette and tubes is replaced by a bulb into which the tubes and burette are sealed; (2) the Hempel absorption pipette is modified so that it can be suspended from hooks; (3) both absorption pipette and desamidizing bulb are so arranged that they can be shaken by a motor. The apparatus,

without losing any of the accuracy of the original, is much more convenient because it can be used an indefinite number of times without disconnecting the parts, and the shaking by hand is replaced by the less laborious and more efficient motor. The latter also increases the rapidity, so that with one apparatus a determination can be made every seven or eight minutes.

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The nature of the free amino groups in the native proteins.

By DONALD D. VAN SLYKE and F. J. BIRCHARD.

[From the Rockefeller Institute for Medical Research, New York.]

The fact that at least some proteins contain a small but definite proportion of their nitrogen in the form of free amino groups capable of reacting with nitrous acid has been proven by one of us. Levites and Skraup failed to obtain lysine from proteins which had been treated with nitrous acid before hydrolysis. This indicates that the ω -NH₂ group of lysine, $\text{NH}_2 \cdot (\text{CH}_2)_4 \cdot \text{CH}_2(\text{NH}_2) \cdot \text{COOH}$, may be free in the protein molecule. As lysine is peculiar among the amino acids in possessing an ω -NH₂ group, it appeared possible that this might be responsible for all or most of the amino nitrogen determined. We have, therefore, determined the free amino nitrogen in ten proteins in which the lysine has already been quantitatively determined in either our laboratory or in Osborne's.

Protein.	Per Cent. of Total N in Lysine.	$\frac{1}{2}$ Lysine N.	Free Amino N.
Ox-hemoglobin.....	12.0 (Van Slyke)	6.0	5.6
Fibrin.....	11.4 (Van Slyke)	5.7	5.3
Hemocyanin.....	8.5 (Van Slyke)	4.25	4.3
Casein.....	6.9 (Osborne)	3.45	3.4
Gelatin.....	6.3 (Van Slyke)	3.15	3.1
Egg albumin.....	4.0 (Osborne)	2.0	2.4
Edestin.....	3.8 (Van Slyke)	1.9	1.2
Zein.....	0.0 (Osborne)	0.0	0.3

Albumoses from Wille Pepton.

Heteroalbumose.....	10.3	5.15	6.3
Protoalbumose.....	9.6	4.8	6.6

Without exception the free amino N of the native proteins