(c) **Saturated Acids.**—Separation of the methyl esters[8] of the saturated acids into five fractions whose boiling range was 145 to 175° (3 mm.) (Table III) was followed by the calculation of the mean molecular weight of each from saponification and iodine numbers, the latter serving as a measure of the degree of contamination by unsaturated acids. These values lay between 259.3 and 289.6, indicating the presence of esters in the $C_{12}$ to $C_{18}$ group. Myristic, palmitic and stearic acids were subsequently identified by their melting points.

These data lead to the following statement of the percentage composition of the saturated acid fraction.

TABLE IV

COMPOSITION OF THE SATURATED FRACTION OF THE RESIDUAL OIL

| Acid | % | Percentage in oil | Glycerides in oil |
|---|---|---|---|
| Myristic | 7.94 | 1.70 | 1.79 |
| Palmitic | 60.48 | 12.92 | 13.55 |
| Stearic | 11.57 | 2.47 | 2.58 |

The same fatty acids were qualitatively identified by means of their melting points in the corresponding fraction of the expressed oil.

## Summary

The chemical and physical characteristics of the expressed and the residual portions of a specimen of Brazil nut oil have been determined. The statement[1] that this oil contains stearin, palmitin and olein has been confirmed. To this list have been added myristin and linolein.

The percentage composition of the residual oil was found to be as follows: myristin, 1.79; palmitin, 13.55; stearin, 2.58; olein, 55.64; linolein, 21.65; unsaponifiable matter, 0.68; residues and undetermined, 4.11.

MADISON, WISCONSIN

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[CONTRIBUTION FROM THE DIVISION OF CHEMISTRY, NEW YORK STATE AGRICULTURAL EXPERIMENT STATION]

# THE ACIDITY OPTIMUM OF YEAST HEXOSEDIPHOSPHATASE[1]

BY Z. I. KERTESZ

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The hexosediphosphoric acid ester and the enzyme which splits it into fructose and phosphoric acid were discovered by Harden and Young. It has been shown that the enzyme is present in practically all kinds of yeast and also in the *Coli* bacteria. It is present in different organs of the animal body, as well as in many higher plants. Although a great many papers have dealt with yeast hexosediphosphatases, we have but very little information concerning its optimum *P*H.

[1] The writer's sincere thanks are due to Professor H. v. Euler and to the Stockhoms Högskola for the opportunity to make this study.

The $P_H$ optima of the zymase group of enzymes have been determined by various authors. In spite of the fact that it might be expected that the $P_H$ optima of these would be in the same acidity range as that of the yeast fermentation as a whole the experiments have not supported this supposition. Thus the optimum of the hexosedehydrogenase was found to be $P_H$ 8.0–8.5.[2]

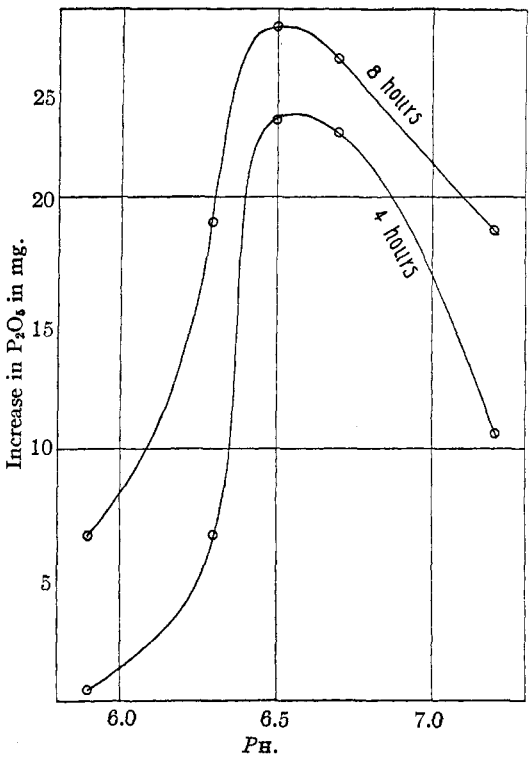


Fig. 1.—The $P_H$ optimum of hexosediphosphatase.

Euler and Nordlund[3] showed that the optimum of the synthetic enzyme of yeast producing hexosediphosphoric acid ester is at $P_H$ 6.4. Because of the obvious importance of knowing this point for all enzymes, it has been determined for yeast hexosediphosphatase.

## Experimental

The sodium salt of hexosediphosphate was made from Candiolin by the method of Meyerhof.[4] The yeast applied was a dry preparation of bottom-yeast "H" of the St. Erick Brewery of Stockholm. The zymase of the yeast was very active. The composition of the reaction mixtures was as follows

1.5 g. dry yeast
2.5 cc. 4% hexosediphosphate
2.5 cc. distilled water
5.0 cc. buffer (citric acid, after S. P. L. Sörensen)

The $P_H$ was determined potentiometrically by the use of hydrogen electrodes. The reaction mixtures were kept in a thermostat at 30°. At the beginning and after certain intervals the increase in amount of inorganic phosphoric acid in the reaction mixture was determined by the micro method of Embden.[5]

[2] H. v. Euler, K. Myrbäck and R. Nilsson, *Ergeb. der Physiol.*, **26**, 547 (1928).
[3] H. v. Euler and F. Nordlund, *Z. physiol. Chem.*, **116**, 229 (1921).
[4] Meyerhof, *ibid.*, **102**, 1 (1918).
[5] Embden, *ibid.*, **113**, 108 (1921).

$P_H$ Optimum of Yeast Hexosephosphatase

| | 4 Hours | | 8 Hours | |
|---|---|---|---|---|
| $P_H$ | $P_2O_5$, mg. | Relative action | $P_2O_5$, mg. | Relative action |
| 5.9 | 0.4 | 1.7 | 6.6 | 25 |
| 6.3 | 6.6 | 29 | 19.0 | 71 |
| 6.5 | 23.0 | 100 | 26.8 | 100 |
| 6.7 | 22.6 | 98 | 25.4 | 95 |
| 7.2 | 10.6 | 46 | 18.8 | 70 |

The results are given in the table. In each set the maximum amount of phosphorus pentoxide formed was taken as 100, and the others were calculated as percentages of it. It will be seen that the optimum $P_H$ is very close to 6.5. At this $P_H$ in eight hours about 38% of the substrate was hydrolyzed.

## Summary

The $P_H$ optimum of the yeast hexosediphosphatase has been determined to be $P_H$ 6.5.

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[Contribution from the Experimental Research Laboratories, Burroughs Wellcome and Company]

# SYNTHESIS OF LODAL AND EPININE

By Johannes S. Buck

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Lodal, 4,5-dimethoxy-2-β-methylamino-ethylbenzaldehyde, was obtained by Pyman[1] by the oxidation of laudanosine. It is also related to papaverine, since N-benzoyltetrahydropapaverine can be degraded to 6,7-dimethoxy-3,4-dihydroisoquinoline,[2] whose methochloride (6,7-dimethoxy-2-methyl-3,4-dihydroisoquinolinium chloride) is identical with the compound obtained from lodal by means of hydrochloric acid.

Epinine, 3,4-dihydroxyphenylethylmethylamine, was obtained by Pyman[1,2] by heating 1-keto-6,7-dimethoxy-2-methyltetrahydroisoquinoline, obtained from laudanosine or papaverine, with hydrochloric acid.

Lodal is a post-partum constrictor for uterine vessels, and a styptic in uterine hemorrhage,[3] while epinine shows hemostatic and pressor properties similar to those of adrenaline,[4] with the advantage of greater stability in solution. Up to the present time no complete syntheses of these compounds have been reported. The author has carried out complete syntheses of lodal and epinine, starting from homoveratrylamine (prepared from vanillin). This amine is monomethylated, via the Schiff base, and

[1] Pyman, *J. Chem. Soc.*, **95**, 1266 (1909).

[2] Pyman, *ibid.*, **95**, 1610 (1909).

[3] Laidlaw, *Biochem. J.*, **5**, 243 (1911).

[4] Barger and Dale, *J. Physiol.*, **41**, 19 (1910).