$3.924/2\cdot 1.175\cdot 0.603 = 52.14°$ as compared to $[\alpha]^{20}_{D}$ 52.06° in distilled water [Riiber, *Ber.*, **56**, 2185 (1923)]. Evidently, the replacement of the displaceable hydrogen atom of glucose by a deuterium does not change the value of the specific rotation for the wave length of sodium light. Such a conclusion does not necessarily apply for very short wave lengths.

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EUGENE PACSU

RECEIVED FEBRUARY 5, 1934

ANALYSIS OF THE DISPERSION CURVES OF SUBSTITUTED PROPIONIC ACIDS

Sir:

It has been observed in this Laboratory that in homologous series of optically active configurationally related substances, individual members may differ in the sign of their rotations in the visible, but the partial rotations of the significant chromophoric group and of the rest of the molecule remain of the same sign. This is also often the case in configurationally related substances similar in structure, such as substances 5, 6 and 7 of the table. Comparing the partial rotations of levo iodo and of dextro azido propionic acids, it was found that the partial rotation of the carboxyl in both cases is dextrorotatory and the partial rotations of the iodine atom and of the N_3- are both levo rotatory. Hence, it may be assumed that these two substances are configurationally related (and not levo iodo- and levo azidopropionic, as assumed by Freudenberg and Kuhn). Furthermore, inasmuch as dextro azidopropionic acid is correlated to levo alanine and this, in its turn, has been correlated to levo lactic acid, it may be assumed that levo lactic acid is correlated to dextro 2-azido and hence to the levo 2-iodo acid. It will be noticed from the table that the partial rotations of the carboxyl groups are levorotatory in alanine and in lactic acid and that they are of reverse sign in the levo iodo and dextro azido acids. Similar reversions of the partial rotations are observed in the configurationally related 2-thio and 2-sulfopropionic acids.

Substance	Rotation in the visible	Groups Y COOH, CHO, $CH_2{=}CH$ Abs. band λ_y, Å.	Sign of α_y	Groups X SH, SO_3H, N_3, NH_2, OH, I Abs. band λ_x, Å.	Sign of α_y
2-Thiopropionic acid	Dextro	2100	−	≃2400	+
2-Sulfopropionic acid	Dextro	2150	+	Schumann region	−
2-Azidopropionic acid	Levo	Distant U. V.	−	≃2830	+
2-Aminopropionic acid	Dextro	2100	+	Schumann region	−
1-Octene-3-ol	Dextro	Distant U. V.	+	Schumann region	−
2-Hydroxyheptanoic aldehyde	Levo	3000	+	Schumann region	−
Lactic acid	Dextro	2150	+	Schumann region	−
2-Iodopropionic acid	Dextro	≃2150	−	≃2840	+

Braces indicate configurational relationship.

The direction and the values of the partial rotations were determined through the analysis of the rotatory dispersion curves in the visible and in the ultraviolet regions by a method previously described [P. A. Levene, A. Rothen and R. E. Marker, *J. Chem. Physics*, **1**, 662 (1933)]. The details of the work, the dispersion curves, and the numerical values of the partial rotation will be published in the near future.

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P. A. LEVENE
ALEXANDRE ROTHEN

RECEIVED FEBRUARY 2, 1934

THE CONSTITUTION OF OESTRIN

Sir:

The work of Butenandt, *et al.*,[1] which demonstrated the presence of a phenanthrene system in the skeleton of the oestrin molecule, left indefinite the position of the five-membered ring which is also known to be present. The possible positions according to Butenandt for this ring were 8:14, 14:13, or 13:12, using the customary sterol nomenclature.

It does not seem to be generally realized that Butenandt's work, when taken in conjunction with the results obtained with unimolecular films of oestrin derivatives, offers a clear proof of the fact that the five-membered ring is in the same position as in the sterols, *i. e.*, 14:13. Measurements made on models show the following *minimal* areas for the cross section of the possible structures.

Formula	Position of the five-membered ring	Minimal cross-sectional area, in sq. Å.
I	8:14	39
II	14:13	33
III	13:12	38

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[1] Butenandt, Weidlich and Thompson, *Ber.*, **66**, 601 (1933).

The experimental value obtained by unimolecular film measurements[2] is 34 sq. Å., with a possible error certainly not greater than 2 sq. Å., so that the first and last structures are decisively eliminated. The elimination of the 8:14 structure is supported by the crystallographic structure of Bernal.[3]

[2] Danielli, Marrian and Haslewood, *Biochem. J.*, **27**, 311 (1933).

[3] Bernal, *Chem. Ind.*, **51**, 259 (1932).

THE PHYSIOLOGICAL LABORATORY J. F. DANIELLI
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PRINCETON, NEW JERSEY
RECEIVED FEBRUARY 12, 1934

DIAMAGNETISM OF NITROSO COMPOUNDS

Sir:

Because organic nitroso compounds display certain anomalous properties, such as intense color and a marked tendency to form double molecules, G. N. Lewis[1] suggested that the explanation of their unusual behavior might be related to the cause of the peculiar properties of O_2 and NO, the former being paramagnetic and the latter showing little unsaturation, although it is an odd molecule. Pauling[2] proposed a structure for oxygen and nitric oxide involving the three-electron bond, which, therefore, in view of the above, led him to ascribe a similar triplet structure, $-\overset{.}{\underset{.}{N}}\,\vdots\,\overset{.}{\underset{.}{O}}:$, to the nitroso group instead of the singlet configuration, $-\overset{.}{N}::\overset{..}{O}:$.

I have measured the magnetic susceptibilities of nitrosyl chloride (NOCl), of nitrosobenzene (C_6H_5NO), and of *p*-nitrosodimethylaniline ($(CH_3)_2NC_6H_4NO$), the first as a liquid, the second both as a solid and as a solute in benzene and toluene, the third as a solute in toluene. The Gouy[3] method was used. All three compounds were found to be diamagnetic, a result which cannot be accounted for by the presence of any reasonable amounts of impurities, since the paramagnetism which would be exhibited if the molecules were in the triplet state would be too large to be so masked.

Likewise the result is not explicable on the basis of the formation of double molecules. The solutions were highly colored, a property which is definitely correlated with the monomeric state. Furthermore, investigation of toluene solutions of *p*-nitrosodimethylaniline, 1 to 7% by weight, with a Klett colorimeter showed that the depth of color was proportional to the concentration, indicating at least a high degree of dissociation into single molecules. Freezing point studies[4] on nitrosobenzene in benzene lead to the same result.

The conclusion is that these compounds, at least, are in singlet states,[5] which indicates that they do not have the similarity to oxygen previously suggested. Since at the present time there seems to be no theoretical basis for choosing between the singlet and triplet configurations for the ground state of this type of molecule, it is perhaps not worth while discussing reasons for the above experimental results. However, it is true that for each of the above compounds several singlet structures could be drawn which on the basis of energy data[6] are known to contribute to the stability of related molecules through resonance and which have no triplet analogs. Such resonance would certainly tend to stabilize the singlet configuration but whether this is the determining factor cannot be stated.

I should like to thank Professor Linus Pauling for suggesting this investigation.

[1] G. N. Lewis, "Valence and the Structure of Atoms and Molecules," Chemical Catalog Co., Inc., New York, 1923, p. 128.

[2] Linus Pauling, THIS JOURNAL, **53**, 3225 (1931).

[3] E. C. Stoner, "Magnetism and Atomic Structure," p. 40.

[4] K. Auwers, *Z. physik. Chem.*, **32**, 52 (1900).

[5] Linus Pauling, THIS JOURNAL, **53**, 1392 (1931).

[6] Linus Pauling and J. Sherman, *J. Chem. Physics*, **1**, 606 (1933).

GATES CHEMICAL LABORATORY E. BRIGHT WILSON, JR.
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RECEIVED FEBRUARY 12, 1934

MUTAROTATION OF β-*d*-RIBOSE AND β-*l*-RIBOSE

Sir:

Owing to the importance of the little known sugar, ribose, not only in its structural relation to other sugars but also in its physiological relation to animal and plant life, since it appears to be of almost universal occurrence in tissues bearing upon the regeneration of life, Phelps and Bates a number of years ago undertook the preparation of a quantity of this sugar in order to study its properties and the improvement of the existing methods of production. One of us (Isbell) has been engaged for some time in the study of the composition of sugar solutions and in the investigation of the isomeric changes which follow solution in water, and has developed a method for determining the composition of the solutions by oxidation with bromine water. Since mutarotation of ribose is not reported in the literature