

yield, 2.12 g. (36%) of white crystalline powder, m. p. 245.5–247.5° (corr.).⁴ With Grote's reagent⁵ a faint orange color developed only after addition of potassium cyanide, as is characteristic of monosulfides.

Anal. Calcd. for $C_{12}H_{30}Cl_2N_2S$: S, 10.53; Cl, 23.23. Found: S, 10.24; Cl, 23.31, 23.35.

bis-(β -Diethylaminoethyl) sulfide dihydrobromide was prepared similarly to the dihydrochloride as a white crystalline powder, m. p. 237.3–237.8° (corr.).

Anal. Calcd. for $C_{12}H_{30}Br_2N_2S$: Br, 40.56. Found: Br, 41.06.

(4) W. E. Lawson and E. E. Reid. *THIS JOURNAL*, **47**, 2821 (1925). give 247° (corr.) as the melting point of the compound prepared from β, β' -dichlorodiethyl sulfide and diethylamine.

(5) I. W. Grote, *J. Biol. Chem.*, **93**, 25 (1931).

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Relations between Rotatory Power and Structure in the Sugar Group. XXXIV. The Possibility of Different Conformations of the Pyranoid Ring¹

BY C. S. HUDSON

In a preceding article by Eugene Pacsu² he suggests that the exceptional character of the rotations of the α - and β -forms of substances having the pyranoid ring structure in the mannose series may be due to a difference in the conformation of the atoms forming the ring. I thank Dr. Pacsu, with whom I have conferred often during the progress of his research, for this opportunity to publish concurrently the reasons which have led me to take the same viewpoint on this question.

In 1930³ I expressed the view that the exceptional character of these rotations indicated that the substances had different ring structures, and I assumed that the α -forms were of the furanoid and the β -forms of the pyranoid type. The experiments of Haworth and Hirst⁴ and their collaborators, designed to test this view, yielded results which showed that it is not tenable and that the substances in question possess only the pyranoid ring. From then on I have searched for an explanation of these unusual rotations that would be compatible with a pyranoid ring structure. The discovery⁵ of a crystalline molecular compound of the α - and β -forms of methyl xyloside suggested the possibility that some of the

(1) Publication authorized by the Surgeon General, U. S. Public Health Service. No. XXXIII was published in *THIS JOURNAL*, **61**, 1658 (1939).

(2) Pacsu, *THIS JOURNAL*, **61**, 2669 (1939).

(3) Hudson, *ibid.*, **52**, 1680 (1930).

(4) Haworth and Hirst, *J. Chem. Soc.*, 2615 (1930), *et seq.*

(5) Hockett and Hudson, *THIS JOURNAL*, **53**, 4454 (1931).

supposedly pure substances of the mannose series might be compounds of this nature, an hypothesis which easily could account for the exceptional rotations. Many efforts by various ways to separate α -methyl mannopyranoside into components and similar experiments on its tetraacetate and on the tetraacetate of β -methyl mannopyranoside, led to negative results; the hypothesis of the compound nature of any of these substances thus became very improbable but nevertheless the failures did not eliminate it as a possibility. Positive proof that they are true chemical individuals, not molecular compounds, was obtained in the course of experiments⁶ on the oxidation of methyl glycosides by periodic acid; their exceptional rotations, as compared with those of their glucose analogs, are not attributable either to ring-size or to any lack of chemical individuality. As was pointed out some years ago,⁷ there are several differences of rotation in the mannose pyranoid series that conform closely with analogous differences in the glucose series, provided one compares substances of α -classification only, or of β -classification only. Pacsu now finds similar relationships in the fructose and sorbose pyranoid series. It would seem therefore that the agreement of rotational differences within the α - or the β -series, when coupled with the known disagreement across an α - β pair, probably indicates differences in pyranoid ring conformation.

(6) Jackson and Hudson, *ibid.*, **61**, 959 (1939).

(7) Hudson, *ibid.*, **43**, 1424 (1926).

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The Preparation of Seleno Ortho- and Meta-Cresols

BY DUNCAN G. FOSTER

In preparing a series of compounds for the measurement of vapor-phase absorption spectra it developed that the two compounds seleno *o*- and *m*-cresol, $CH_3C_6H_4SeH$, had never been described in the literature. The writer has prepared them by the standard method of treating the tolyl Grignard reagents with elementary selenium,¹ operating in a current of hydrogen. When hydrogen was not used no selenocresols were obtained, but only high-boiling selenides, which perhaps explains why they are not reported.

(1) Taboury, *Ann. chim. phys.*, **15**, 5 (1908).