

water-bath and the residue taken up with chloroform and again evaporated to dryness. This process was again repeated, then taken up in chloroform, standard acid added and the assay completed.

1. 0.0869%	3. 0.107 %
2. 0.0871%	4. 0.0985%
Average 0.095 %	

Positive results were obtained by the isonitrile test.

Experiment 12. Samples of the drug were assayed according to the above experiment, and the final chloroform extract was dried in an oven at 80° C. for 15 minutes.

1. 0.0676%
2. 0.0893%
3. 0.072 %

Positive isonitrile tests were obtained.

Experiment 13. Three lots of drug were macerated for 1 hour with stronger ammonia water and ether, and then extracted in a Soxhlet apparatus, ether being used as a solvent.

The marc from these assays was extracted with alcohol after the addition of small amounts of stronger ammonia water. An additional amount of basic material was obtained.

First Extraction.	Marc Extract with Alcohol.	Total.
1. 0.0894%	0.0382%	0.1276%
2. 0.096 %	0.047 %	0.143 %
3. 0.094 %	0.039 %	0.133 %

Positive isonitrile tests were obtained.

Experiment 14. Eight samples of drug were macerated over night with ether and stronger ammonia water and extracted in a Soxhlet, ether being used as a solvent.

1. 0.077 %	5. 0.089 %
2. 0.0788%	6. 0.089 %
3. 0.067 %	7. 0.096 %
4. 0.072 %	8. 0.0773%
Average 0.0812%	

Positive isonitrile tests were obtained.

Aliquot portions of the last five samples obtained after the purification process were evaporated to dryness on a water-bath and dried 1 hour. The residues were taken up in chloroform, standard acid added, and the chloroform then removed by evaporation before the assay was completed.

4. 0.0413%	7. 0.039 %
5. 0.044 %.	8. 0.036 %
6. 0.039 %	Average 0.0398%

These titrated residues gave no isonitrile test.

(To be continued.)

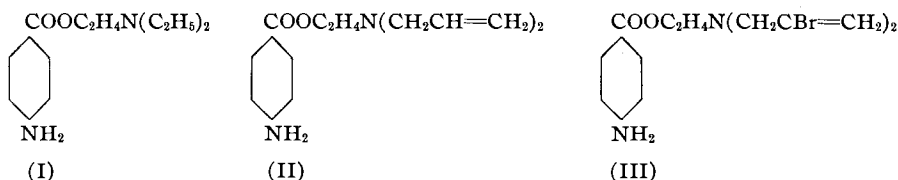
DI-β-BROMALLYLAMINO ETHYL *p*-AMINO BENZOATE.*

BY W. BRAKER AND W. G. CHRISTIANSEN.

During the course of an investigation of a variety of local anesthetics, we have prepared di-β-bromallylamino ethyl *p*-amino benzoate. This substance is analogous to procaine; the diethylamino group in the latter has been replaced

* Scientific Section, A. PH. A., Madison meeting, 1933.

with a dibromallyl amino group. The corresponding diallylamino compound is known (1). The structural relationship between procaine (I), di- β -allylamino ethyl *p*-amino benzoate (II) and di- β -bromallylamino ethyl *p*-amino benzoate (III) is indicated below.



The compound (III) was obtained by condensing di- β -bromallylamino ethanol with *p*-amino benzoyl chloride. The substance was isolated as its dihydrochloride. A stable 2% aqueous solution of di- β -bromallylamino ethyl *p*-amino benzoate dihydrochloride could be made, but an electrometric titration indicated the p_{H} of this solution to be 1.9. An effort to buffer with disodium hydrogen phosphate was unsuccessful because of the fact that the addition of a minute quantity of the buffer resulted in the precipitation of the compound.

A borate of the base (III) was also prepared but the compound was hydrolyzed in aqueous solution thereby precluding biological testing.

EXPERIMENTAL.

Preparation of di- β -Bromallylamino Ethanol.—Fifty Gm. of 2,3-dibromopropene and 8 Gm. of mono-ethanol amine were dissolved in 100 cc. of 95% alcohol; 80 Gm. of silver oxide were added in small quantities with stirring; the mixture was stirred for two hours after the addition of all the silver oxide. The mixture was then filtered and the filtrate fractionated. Twenty-five Gm. of a light yellow oil were obtained boiling at 141–145° C. at 9–10 mm. Yield—66%.

Assay.	Nitrogen.	Bromine.
Found	4.58%	53.24%
Calc. for C ₈ H ₁₃ Br ₂ NO	4.68%	53.51%

Preparation of p-Amino Benzoyl Chloride.—This was obtained by the method of McMaster (2).

Preparation of di- β -Bromallylamino Ethyl p-Amino Benzoate.—2.65 Gm. of *p*-amino benzoyl chloride were dissolved in 20 cc. of dry benzene. To this solution, one consisting of 5.1 Gm. of di- β -bromallylamino ethanol in 60 cc. of benzene was added. The solution was refluxed for 3 hours. A yellow solid which separated during refluxing was filtered off, washed with ether and dried *in vacuo*. An assay indicated that it was not the compound intended and it was not further investigated.

The benzene filtrate from the reaction was treated with dry hydrochloric acid gas. A light yellow, very viscous oil separated. The benzene layer was decanted and the oil was dried *in vacuo* over calcium chloride and sodium hydroxide.

The substance was identified by assay to be the dihydrochloride of di- β -bromallylamino ethyl *p*-amino benzoate.

Assay.	Nitrogen.	Chlorine.
Found	5.61%	15.05%
Calc. for $C_{15}H_{20}O_2N_2Cl_2Br_2$	5.70%	14.46%

SUMMARY.

- (1) Di- β -bromallylamino ethyl *p*-amino benzoate was prepared.
- (2) Aqueous solutions of the dihydrochloride are too acid for anesthetic tests. The solutions are incapable of buffering without precipitating the base from solution.

BIBLIOGRAPHY.

- (1) U. S. Patent 1,388,573.
- (2) *J. A. C. S.*, 50 (1928), 145.

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PHYSICS IN PHARMACY.

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(Continued from page 221, March issue.)

In *Fig. 13*, for example, quantities of absorbed, saturated solutions of KCl, BaCl₂ and FeCl₃, under identical experimental conditions, are recorded. With increase in valence, there is increase of absorption. Furthermore, FeCl₃ in dilute solution is strongly hydrolyzed. The retained liquid volume must vary, not only with the concentration of the solutions, but also with the electrocapillary effects of the different ions,¹ and finally, with the influence of the dissolved substance on the state of swelling of the cellulose fibres.

10. Influence of Concentration and Temperature.

TABLE IX.—INFLUENCE OF CONCENTRATION.

System: FeCl ₃ , concentrations as below, vs. Water. <i>d</i> = 1.5 mm. Paper dry at start.	Duration, Hours.	FeCl ₃ —Increase, Mm.	H ₂ O—Decrease, Mm.	Total Difference, Mm.
45% FeCl ₃ Solution.				
	2	0.5	1.0	1.5
	5	1.0	2.5	3.5
	20	2.0	4.0	6.0
	40	2.6	5.0	7.6
	72	3.0	6.5	9.5
23% FeCl ₃ Solution.				
	2	...	0.9	0.9
	4	0.5	2.0	2.5
	20	1.2	3.0	4.2
	40	2.0	4.0	6.0
	70	2.2	4.0	6.2

¹ We mention here the phenomena of the so-called "abnormal osmosis," cf. a résumé by K. Söllner, *Zschr. f. Elektrochemie*, 36 (1930), 234.