# CHEMICALLY PURE ANHYDROUS DEXTROSE SHOULD BE OFFICIAL IN THE UNITED STATES PHARMACOPŒIA.*

BY JOSEPH L. MAYER.

When starch is treated with an acid it is converted into dextrose; if the process of hydrolysis is complete the end-product is mainly dextrose and the material is solid, but if hydrolysis is incomplete a liquid product is obtained which the U. S. P. refers to, defines and describes as follows:

"Glucose is a syrupy product obtained by the incomplete hydrolysis of starch, consisting chiefly of dextrose (d-glucose) ($C_6H_{12}O_6$ = 180.10) and dextrins."

It is unfortunate that the Pharmacopœia refers to this syrupy material as "Glucose."—

On page 534 of the U. S. P.—among test solutions and reagents, the subject of Dextrose is dismissed with the following few words:—

"Glucose, Dry (Dextrose, d-glucose), $C_6H_{12}O_6$. A white, anhydrous powder which complies with the tests for identity and purity given under 'Glucosum.'"

In reality dextrose, grape sugar, and glucose are synonymous and refer to the crystalline dextro-rotatory sugar with the formula $C_6H_{12}O_6$—confusing the solid and liquid product is unscientific and misleading. In addition, the tests to be applied to the crystalline material should be different than those for the liquid preparation—making the statement: "Complies with the tests for identity and purity given under 'Glucosum,'" is in this case a serious error.

Since the liquid product can be made from any starch it should be known as "Starch Syrup," and thus it would not be employed where "Glucose" is ordered.

Those who are familiar with the use of glucose therapeutically and as a food are fully aware of the fact that to employ this liquid material is dangerous as it contains products which require the digestive apparatus to convert them into dextrose; and it is this very action which, being objectionable, is overcome by employing the end-product—dextrose; and thus synthetically producing the reaction outside of the system.

Chemically pure anhydrous dextrose is now very extensively employed—therapeutically and as a food—therefore it should be officially recognized by the United States Pharmacopœia giving a description, identity tests, qualitative tests for chlorides, sulphates, neutrality, etc., and a purity rubric, including a quantitative method of assay; probably a volumetric one, such as Fehling's or Benedict's, a statement of its specific rotatory power and an ash standard. Mention should be made of the fact that it melts at 146° C. (294.8° F.) and that at a higher temperature decomposes it with the production of caramel. This information would be of value to those who sterilize the solution by autoclaving and to those seeking information relative to what effect this has on the sugar.

The temperature of the autoclave at 15 pounds pressure is 121° C.—therefore the dextrose solution remains unaltered, chemically, during the sterilization.

Since the liquid product now official under the name of "glucose" is of value pharmaceutically—it should be retained in the United States Pharmacopœia, but

* Part of an address before the Monthly Staff Conference, Greenpoint Hospital, Brooklyn, N. Y., December 21, 1922.

a statement should appear in connection with it and the chemically pure anhydrous dextrose, calling attention to their chemical nature and their specific uses.

DEPARTMENT OF
ANALYTICAL AND PHARMACEUTICAL CHEMISTRY,
BROOKLYN COLLEGE OF PHARMACY.

---

## NOTE ON THE TOXICITY OF CASTOR SEED.

BY EDWIN DOWZARD.

The poisonous nature of Castor Seed, which is due to the toxalbumin Ricin, has long been known. A considerable amount of work has been done on the extraction of Ricin, and the determination of its toxicity. The most active preparation has been obtained by Osborne, Mendel & Harris.[1]

Ricin is toxic in the extremely small dose of 0.0005 mg. per kilo when administered to rabbits subcutaneously. When given by the mouth, 4 mg. proved fatal to a medium-sized rabbit. A peculiar property of this very poisonous body is the time required to produce toxic effects. When administered subcutaneously, 0.0005 mg. per kilo did not produce death until after the elapse of seven days, while two days were required for 4 mg. administered by the mouth. Even when given in comparatively large amounts, death did not ensue sooner than fifteen to eighteen hours after administration of the dose.

Ricin is, evidently, a very slowly acting poison.

In all the extraction methods described, the oil-free seed is treated with a 10% salt solution. The active ricin and the inactive globulin are both soluble in 10% salt solution. The non-poisonous globulin which is present in a greater amount than ricin is, however, insoluble in water, while ricin is soluble.

A lengthy process is required to separate the globulin from the ricin. It would be much simpler to extract the oil-free seed with distilled water which would dissolve the ricin but not the inactive globulin.

The writer had occasion to make an investigation in connection with the toxicity of ricin, various extracts of castor seed, and castor seed after the removal of the dark skin. So far as the writer is aware, the toxicity of castor seed, when administered by the mouth, has not been determined. For this reason, it was considered to be of sufficient interest to publish the results obtained.

The raw material consisted of the residue from the cold pressing of castor oil. Heat had not been applied to the seed before, during, or after the pressing process. The material contained 23 per cent. of oil. The average oil content of castor seed is about 50 per cent. The toxicity of the unpressed seed was calculated on this basis. Guinea pigs were used as test animals. The method of administration was as follows:

The seed, after separating the dark skin, was broken into small pieces. A portion was accurately weighed and the pieces gently forced down the throat of the animal by means of a stiff broom fiber. The material was readily swallowed after being forced down the throat for a short distance. It was found possible by the above procedure to administer exact quantities of the seed. There are no

[1] *Amer. Jour. Physiol.*, 14, 259–286, 1905.