RESIN JALAP.*

BY J. PAUL SNYDER.

The author finds that the U. S. P. standard of 35 percent chloroform soluble matter in resin of jalap is indefinite, because the amount depends entirely on the method employed for extracting the resin.

His conclusions are that the Pharmacopœia should state definitely the amount of sample and chloroform to be used, the method to be employed, and the length of time the resin should be treated with the solvent.

The United States Pharmacopœia VIII revision directs that not more than 35 percent of resin should be soluble in chloroform. However, the Pharmacopœia does not give any definite direction as to the method that should be used to obtain the chloroform soluble portion, and, as the manipulation is left entirely to the discretion of the analyst, the method of procedure that would undoubtedly suggest itself to him would be to add to a weighed portion of the resin several successive portions of chloroform, carefully stir the resin and the solvent, filter and collect the different portions of chloroform, evaporate the chloroform, dry to constant weight and weigh. However simple the above appears, there are two factors which cause considerable error in the results.

1. When the chloroform is added to the jalap a sticky, gummy mass results, and it is improbable that the chloroform penetrates to all portions of the resin, even with considerable stirring, and we do not obtain the entire amount of the chloroform soluble. Placing the jalap and chloroform in a cylinder and shaking on a mechanical shaker does not offer any assistance, as the resin sticks to the sides of the cylinder, and, again, the solvent does not come in contact with all portions of the resin.

2. The chloroform soluble portion does not appear to be extracted with a reasonable number of extractions. A one-gramme sample, after being treated with 16 successive portions of chloroform, still contained some chloroform soluble, as from the last portion a weighable residue was obtained. A second resin yielded a residue after being subjected to 19 portions of chloroform.

To continue the extractions further than this number of times is not practical, and this method was therefore discarded.

A weighed portion of the resin was then dissolved in alcohol, transferred to a separatory funnel, and an equal volume of water added, and the whole shaken out with several portions of chloroform, the chloroform filtered and collected in a tared flask, the chloroform evaporated, and the flask heated and weighed. This yielded high results, and, as a portion of the alcohol readily mixed with the chloroform, this method was rejected.

It was now thought advisable to resort to the Soxhlet apparatus, and a one-gramme sample was extracted with chloroform for twenty hours, the chloroform evaporated, the flask dried and weighed, and it was found that practically all the resin was entirely soluble in chloroform. One thing, however, we noticed was that after the chloroform had cooled down in the flask a portion of the resin

* Read in abstract before Scientific Section, A. Ph. A., San Francisco meeting.

separated and clung to the flask in sticky masses. We now decided to treat a portion of the resin with chloroform, under a reflux condenser, cool the extraction, and filter out the undissolved residue, evaporate dry and weigh. We accordingly did this, and found that the results were higher than the U. S. P. limit, 35 percent.

We then deemed it necessary to investigate the solubility of resin jalap in chloroform, and the following is the result of this investigation:

Sample No. 1 submitted by our manufacturing department:

Chloroform soluble by Soxhlet method, 98.5 percent.

Chloroform soluble by Reflux method, 41.3 percent.

An examination of the drug from which this resin was prepared showed that it conformed to the U. S. P. tests for identity and purity. We then prepared from this lot of jalap a small portion of the resin (sample No. 2) according to the directions given in the U. S. P., and which gave the following results:

Chloroform soluble by Soxhlet method, 78.6 percent.

Chloroform soluble by Reflux method, 42 percent.

A sample of lot No. 1 was submitted to a well-known firm of analysts, with the direction that they examine the resin according to the U. S. P. They reported the chloroform soluble to be 16.8 percent. A request for their method of obtaining the chloroform soluble portion was then made to them, and they replied that they had made the test according to the following:

One gramme of the resin was stirred up with five or six portions of the solvent in a small beaker. The solvent was filtered into a weighed flask, the solvent distilled off, and the resin dried to constant weight.

We then informed them that by using a similar method we were unable to completely exhaust the resin with from fifteen to twenty portions of chloroform, and stated that by using the Soxhlet apparatus we obtained considerable higher results.

They then replied as follows: "The chloroform soluble as determined by us (16.8 percent) is undoubtedly too low. We have determined the chloroform soluble by extracting in a Soxhlet, allowing the extracted mass to stand over night, and filtering out the insoluble resin. Testing in this way we get a chloroform soluble of 33.80 percent, or a trifle under the U. S. P. limit. This is not a very satisfactory method of extraction, as the resin floats on the chloroform and sticks to the sides of the tube, and some insoluble resin comes over the surface. We next tried boiling the resin in chloroform with a reflux condenser, allowing to stand over night and filtering off the chloroform soluble. This amounts to 41.8 percent, but the resin is not completely soluble in cold chloroform, a jelly-like mass remaining in the flask. The resin obtained from the Soxhlet extraction dissolves very readily in cold chloroform. In each case where an extraction of this kind is made it is necessary to allow the extract to cool before filtering from the insoluble resin, and it is also necessary to test the extracted resin by dissolving it in chloroform. In extracting a resin of this kind more or less of it will be carried over into the extraction flask.

"When possible we always prefer to dissolve the material in the cold solvent."

Letters sent to various manufacturers of resin jalap, requesting them for their method of obtaining the chloroform soluble, brought forth the following two replies:

From manufacturer No. 1: "We find it makes some difference as to how the test for chloroform solubility is applied. For example, in one case, working on exactly the same jalap resin, when it was powdered and then mixed with sand and extracted with chloroform, 21 percent was found to be soluble in chloroform.

Practically the same result was obtained if it was mixed with talc, but when the powdered resin was slowly added to the chloroform a little over 28 percent solubility was found.

" The most satisfactory way of applying the test we have found to be as follows:

" Take a gramme of the finely-powdered resin and add it to 100 Cc. of chloroform contained in a flask which can be tightly stoppered, shake in a mechanical shaker for several hours, let stand to settle and decant the chloroform through a filter paper, wash the residue with a little chloroform (about 25 Cc.), evaporate the combined chloroform filtrate to dryness in a tared flask, and weigh the residue."

From manufacturer No. 2: "About one gramme of a coarsely powdered sample is weighed, and this is extracted in a beaker or small evaporating dish with chloroform, using a stirring rod to aid in the extraction. The chloroform is then decanted from the residue each time onto a small filter and filtrate caught in a tared beaker. These extractions are repeated until the chloroform, on evaporating a few drops, shows no residue. The filter washed thoroughly with chloroform, and total chloroform filtrate is evaporated on water-bath. The residue is dried at 100° C. and weighed."

In the method submitted by manufacturer No. 1 no attempt is made to determine if the chloroform soluble portion has been completely extracted by the chloroform, while with the method submitted by manufacturer No. 2 the evaporation of a few drops of the solution is not sufficient to show the completed extraction with the solvent.

From our investigation of the method of stirring a portion of the resin with several portions of chloroform, it would appear that neither method submitted by the two manufacturers is effective for the complete removal of the chloroform soluble portion of resin jalap.

We then prepared sample No. 3, which was a resin prepared from another lot of jalap which had been found to be U. S. P. quality, and when tested for chloroform solubility by the Soxhlet and Reflux methods yielded the following percentages:

Chloroform soluble by Soxhlet method, 69.7 percent.

Chloroform soluble by Reflux method, 41.9 percent.

Samples Nos. 4, 5, and 6 were purchased in the open market from reliable manufacturers, and from which the following results were obtained:

No. 4, chloroform soluble by Soxhlet method, 84.6 percent.

No. 5, chloroform soluble by Soxhlet method, 76.2 percent.

No. 6, chloroform soluble by Soxhlet method, 74.6 percent.

No. 4, chloroform soluble by Reflux method, 41.8 percent.

No. 5, chloroform soluble by Reflux method, 38.4 percent.

No. 6. chloroform soluble by Reflux method, 38.6 percent.

Sample No. 7 was secured from Dr. Geo. M. Beringer, of the U. S. P. Revision Committee, and which is claimed by him to be a resin jalap, strictly U. S. P., made by him from authentic drug purchased for U. S. P. committee. This gave the following solubilities:

No. 7, chloroform soluble by Soxhlet method, 94.1 percent.

No. 7, chloroform soluble by Reflux method, 53.1 percent.

This sample was also tested by simply repeatedly washing the resin by pouring the chloroform on the resin, stirring and filtering the solution, collecting the filtrate, evaporating to dryness, heating and weighing. However, after the sixteenth washing a weighable portion was still being extracted.

The chloroform used in the above determinations was examined according to the U. S. P. VIII and found to answer these requirements for purity.

The following is a tabulated list of the results obtained by the Soxhlet and Reflux methods of the seven samples examined:

Samples	Soxhlet method	Reflux method
Number 1	95.5	41.3
Number 2	78.6	42.0
Number 3	69.7	41.9
Number 4	84.6	41.8
Number 5	76.2	26.4
Number 6	74.6	36.6
Number 7	94.1	53.1

Conclusions.—The U. S. P. standard of 35 percent chloroform soluble for resin jalap appears to be very indefinite, the amount of chloroform soluble depending upon the method used to extract the resin.

From the above data it would appear that it would be highly desirable for the U. S. P. IX to state definitely the method that should be used, the amount of sample, chloroform, and the length of time the resin is to be treated with the solvent, as the chemist would then be able to secure concordant results, and no difficulty would arise as to whether the resin was of U. S. P. quality or not.

Also, in concluding, I wish to thank Mr. R. C. Drake for analytical data, and to also acknowledge my indebtedness to Mr. J. Fred. Windolph for his many valuable suggestions.

ANALYTICAL LABORATORIES OF THE NORWICH PHARMACAL COMPANY.

DETECTION OF SMALL QUANTITIES OF GLYCERIN.

Mandel and Neuberg (*Biochem. Zeit.* through *Apoth. Zeit.*) have worked out a method for detecting small quantities of glycerin, depending on the conversion of the latter into glycerose and identifying this by the well-known orcin reaction. About 2 Cc. (mils) of the glycerin solution are mixed with 3 drops of normal sodium hypochlorite solution and the mixture boiled for one minute. After the addition of three more drops of the hypochlorite solution the liquid is boiled again for one minute, then mixed, while still hot, with three drops of hydrochloric acid (1.124) and boiled for 30 to 60 seconds or until the chlorine is expelled and a perfectly colorless solution is obtained. The liquid is then mixed with an equal volume of fuming hydrochloric acid and a few crystals of orcin and boiled again, when in the presence of glycerin a violet or greenish-blue coloration will be produced. It is well known that pentoses, etc., give a similar reaction, but these products can easily be distinguished from glycerin by their reducing power on Fehling's solution. Glycerin reduces Fehling's solution only after having been oxidized to glycerose.—*Druggists' Circular.*