It is hoped that our survey has helped reveal some of the preferences and peculiarities of the present-day prescription writer. If the facts we have brought out are not entirely a source of satisfaction, they at least point in what direction professional pharmacists must bend their efforts to secure the desired improvements.

ADDITIONAL NOTES ON TRAGACANTH JELLY.*

BY ADLEY B. NICHOLS.**

At the 1937 Convention of the AMERICAN PHARMACEUTICAL ASSOCIATION, the writer reported on the "Evaluation of Tragacanth and Tragacanth Mucilages,"[1] in the hope that a means of establishing uniformity in the viscosity of Ephedrine Jelly might be accomplished eventually.

The N. F. VI formula for the jelly calls for 1 per cent of tragacanth but various operators have reported unsatisfactory results with the final product, the general opinion being that the jelly is too thin. When the product was first proposed with a larger amount of tragacanth included in the original formula, mixed criticism resulted, some stating that the product was too thick, while others claimed it was too thin and again some considered it to be of about the proper consistency. The cause of the difficulty obviously was to be found in the variety or lot of tragacanth being used to produce the jelly, poorer varieties giving weak gels while the better varieties gave correspondingly firmer gels.

In the previously mentioned paper a method of evaluating tragacanths was presented, whereby the speed of a steel ball through a given column of the gel was determined. The time required for the ball to travel its course was interpreted in terms of relative tragacanth value, the results of a series of experiments with each variety of tragacanth being plotted, dilution *versus* the log of the seconds of time. Certain lots of tragacanth were seen to be undesirable according to the results obtained, while for the others it seemed entirely practical to refer to the curves on the graph and from these to calculate the necessary amount of any tragacanth to use for the preparation of a gel of predetermined consistency.

During the course of the original experiments it was recognized that with age, tragacanth gels became more firm, a matter for consideration if uniformity was to be established. In a series of experiments designed to determine the effect of age upon viscosity, jellies were made with five different lots of tragacanth, the amount of each tragacanth used varying according to its own graph curve, so that all jellies would be of nearly the same consistency or viscosity. Approximations were made usually to the nearest unit of five in terms of water ratio, with the final result that the first ball readings of the finished products were recorded as: 33, 40, 43, 39 and 28 seconds, comparatively close for such a relatively low reading. Readings were then repeated at intervals, first of a few days each, then monthly and later of longer periods.

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[1] JOUR. A. PH. A., 26, 823 (1937).

In Table I will be found the results of the various readings, showing a general increase even on the third day and progressing definitely from thereon. However, a striking increase will be noted for tragacanth No. 1 over the others and a slight increase of Nos. 13 and 15 over 9 and 14, those of each pair, however, comparing fairly well with each other. It will thus be noted that the so-called poorer tragacanths show a greater increase in the viscosity of their gels upon aging than do the apparently better grades, indicating that there is yet an undetermined factor involved. Specimen No. 1 is one which has been in the laboratory for many years, more or less exposed during a good portion of that time. Likewise Nos. 13 and 15 were older samples, the actual age being unknown to the writer, while Nos. 9 and 15 were tragacanths purchased at the time the original experiments were undertaken. Thus it may be that the aging of the tragacanth results in such a dehydration that the full effect of the gel consistency cannot be determined in a short period of time and cannot be judged in comparison with a fresher specimen. As time progresses there will be an opportunity to check these tragacanths again to see the results of aging the crude drug itself. It is definitely recognized that powdered gums give lower gel values than the whole gum of the same lot, which may be due to this same consideration, gums usually requiring heat and further drying before they are capable of being powdered. A determination of moisture content therefore may be an aid in the solution of the problem.

TABLE I.

Tragacanth Number.	Ratio 1 Gm. Trag. to—Cc. of Water.	Rate of Fall of Ball in Seconds. 1 Day.	3 Days.	6 Days.	15 Days.	1 Mo.	2 Mos.	3 Mos.	4 Mos.	5 Mos.	7 Mos.	10 Mos.
1	48	33	46	59	114	190	350	464	785	915	1400	
9	90	40	48	53	67	95	125	114	139	145	165	x
13	70	43	53	66	89	129	200	213	353	338	x	x
14	80	39	46	51	71	85	122	131	131	155	216	x
15	60	28	38	47	78	120	180	220	410	223	x	x

Effect of age upon the viscosity of tragacanth gels.

The tragacanth gels shown in Table I were prepared from tragacanth and water, and preserved with the three oil-like ingredients found in the jelly of Ephedrine Sulfate, namely, methyl salicylate, eucalyptol and oil of dwarf pine needles. Five hundred cc. of gel was prepared in each case and stored in a liter bottle. Each test for viscosity required the opening of the stock container, the pouring out of a large test-tube full of material upon which the test was actually made and the return of that material to the stock container after the completion of the test. Naturally, every time the container was opened and handled in this manner, there was ample opportunity for the loss of vapors of the preserving mixture, leading eventually to a depletion of the preservative sufficient to permit spoilage. This is believed to account for the decomposition encountered in the specimens, beginning apparently in the fifth month in one case and noticed in the seventh and tenth months in others. This decomposition of tragacanth gels is characteristic where proper preservatives are not used and the suggestion has been made that a gel buffered by the addition of 1.6 Gm. of sodium phosphate per 1000 Gm. would solve the difficulty. It seems doubtful, however, whether this is necessary or would even

work. At least in a series of gels prepared at the same time as those represented by the Table I experiments, but opened not at all, or at least but occasionally during the year, there is no sign whatever of any decomposition. A duplicate set prepared with the added sodium phosphate appears no different from the controls it duplicates. It must be remembered also that Jelly of Ephedrine Sulfate should be dispensed and used from a tube and not from an open container. In such a case there would be no opportunity for a loss of volatile preservative.

As it stands at present, it would seem that the proper evaluation of tragacanth cannot be made until the question of what might be called abnormal swelling in certain specimens has been satisfactorily answered. Likewise, neither would it be possible to expect any marked uniformity in tragacanth gels such as is basically represented by the N. F. Ephedrine Jelly, until the evaluation of tragacanth itself has been properly determined.

CONCLUSIONS.

Certain tragacanths which appear of poor quality as tested by the falling ball-gel method, show an increased value over so-called good tragacanth when their gels are allowed to age. This may be due to a dehydration of the tragacanth itself upon aging, with the resulting change in the nature of the gel prepared from it.

The Preservation of Jelly of Ephedrine Sulfate, N. F. VI, has been considered and the feeling is expressed that the present formula is probably satisfactory in that respect.

HYDROGENATED CASTOR OIL IN OINTMENTS—PART III. PRODUCT OF SULFONATION.*

BY GEORGE W. FIERO.[1]

Sulfonated oils have long been employed in industry as emulsifying agents and detergents. In cosmetics they have been included in cleansing creams for detergent action as well as to insure proper emulsification. In the manufacture of these oils, the sulfuric acid unites with the fatty acid molecule at the double bond to produce the "sulfonated" oil. Actually this is not sulfonation, but more correctly "sulfation" since the "—OSO_2OH" group is attached to the carbon chain.

In the case of hydrogenated castor oil, however, there are no double bonds which the sulfuric acid may attack, and the reaction is between the sulfuric acid and the "—OH" group on carbon atom 12 to produce the sulfate ("—OSO_2OH") at this point. Thus the product of "sulfonation" of hydrogenated castor oil differs from other "sulfonated" oils chemically. Physically it likewise differs in that it is solid while they are liquids.

"Sulfonated" hydrogenated castor oil[2] (hereafter abbreviated "SHCO") is a yellowish solid, practically insoluble in hot water, but soluble in alcohol and liquid petrolatum. The combining weight as determined by the acid value, was found to be 412 (theoretical 410). It readily combined with alkalies to produce salts

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[1] University of Buffalo, School of Pharmacy.

[2] Manufactured by National Oil Products Co., Harrison, N. J.