

- Stein, W., 1868: About the Coloring Material in Rhamnus Berries (Persian, Avignon or Yellow Berries). *Jour. für prakt. Chemie*, vol. 105, p. 97.
- Tavera, T. H. Pardo de, 1892: Medicinal Plants of the Philippines (Translation by J. B. Thomas, 1901), p. 82.
- Tabernæmontanus, Theodor, 1588: *Neu und Vollkommen Krauterbuch*. (Basel, 1687), Buch III, cap. 96, p. 1489.
- Theophrastus, Eresios, 314 B. C.: *de historia plantarum* (Theodor Gaza, interprete, Parisiis, 1529), lib. III, cap. XVII, p. 113.
- Thorpe, T. E., and Miller, A. K., 1892: *Jour. of Chem. Soc. (London)*, vol. 61, p. 1.
- Tragus (Bock), Hieronymus, 1551: *Kreuter Buch* (1556), p. 369.
- True, R. H., and Klugh, G. F., 1909: Cultivation of Cascara Sagrada. *Proc. Am. Pharm. Asso.*, vol. 57, p. 824.
- Tschirch, A., and Bromberger, H., 1911: The Bark of Rhamnus catharticus. *Archiv. der Pharm.*, vol. 249, p. 218.
- Tschirch, A., and Pool, J. F. A., 1908: Barks of Rhamnus Frangula and Rhamnus Purshiana. *Archiv. der Pharm.*, vol. 246, p. 315.
- Tschirch, A., and Polacco, R., 1900: The Fruits of Rhamnus cathartica. *Archiv. der Pharm.*, vol. 238, p. 459.
- Tutin, F., and Clewer, H. W. B., 1911: The Constituents of Rhubarb. *Trans. Br. Chem. Soc.*, vol. 99, p. 946.
- Umney, Charles, 1874: Rhamnus Frangula versus Rhamnus Catharticus. *Pharm. Jour. and Trans.*, ser. 3, vol. 5, p. 21.
- Van Pelt, 1874: *Pharm. Centralhalle*, vol. 1, p. 268.
- Waldstein, Françoise et Kitaibel, Paul, 1802: *Descriptiones et Icones plantarum rariorum Hungariæ*, vol. 3, tab. 255 and 283.
- Waljaschko, N. A., and Krassowski, N., 1908: Constituents of the Fruit of Rhamnus Cathartica. *Jour. Russ. Phys. and Chem. Ges.*, vol. 40, p. 1502.
- Walter, Thomas, 1788: *Flora Caroliniana*, p. 101.
- Ward, H. M., and Dunlop, J., 1887: The Berries of Rhamnus infectorius and other species. *Pharm. Jour. and Trans.*, ser. 3, vol. 18, p. 360.
- Warin, J., 1905: The Determination of the Active Principles of Frangula Bark. *Jour. de Pharm. et Chim.*, ser. 1, vol. 21, p. 253.
- Warin, J.: The Determination of the Active Principles in the Fluid Extracts of Frangula and Cascara Sagrada. *Jour. de Pharm. et Chim.*, ser. 6, vol. 22, p. 12.
- Wight, Robert and Arnott, G. A. Walker, 1834: *Prodromus Floræ Peninsulæ Indiæ Orientalis*, p. 164.
- Willdenow, Carl Ludwig, 1806: *Hortus Bero-linensis*, 1806-1810.
- Winckler, F. L., 1849: On the Bitter Matter (Cathartin) of the Ripe Berries of Rhamnus cathartica. *Jahr. für prakt. Pharmacie*, vol. 19, p. 221.
- Wuerffel, L., 1907: The Adulteration of Cortex Frangula with the bark of Alnus glutinosa. *Apoth. Zeit. (Berlin)*, vol. 22, p. 283.
- Zeig, A. C., 1889: Active Constituents of Rhamnus Purshiana. *Proc. Am. Pharm. Asso.*, vol. 37, p. 261.
- Zeig, A. C., 1905: The Cascara Industry. *Pharm. Era*, vol. 34, p. 150.

Acknowledgment for much kind assistance is made to Mr. Tweedell, Reference Librarian at the John Crerar Library, Chicago, and to Miss Wycoff, Librarian of the Lloyd Library, Cincinnati.

FRESHLY PRECIPITATED RESINS IN AQUEOUS MEDIUM.

SAMUEL T. HENSEL, PH. G.



The object of this paper is to serve the two-fold purpose of suggestion to some future investigator, and to present a practical application of an observed phenomenon.

It is prompted by the reading of a query sent to the editor of one of our leading trade journals, which appears in the current issue of December, just received. The correspondent asks for information concerning the method to be employed in the preparation of a mixture of rose-water, glycerin and tincture of benzoin, a well-known and popular form of toilet cream.

Ten years ago, or more, the writer observed that the various resinous tinctures of the United States Pharmacopœia, such as the tinctures of benzoin, myrrh, asa-fetida, etc., were differently affected by the same volume of water; the permanence of suspension of the freshly-precipitated resin, depending upon the method employed in bringing these two substances together. The two following experiments were performed at that time.

Experiment No. 1:—Three ounces of distilled water were introduced into a four-ounce prescription bottle, and one half fluid-dram of tincture of benzoin was then carefully added, drop by drop, shaking the contents of the bottle vigorously after the addition of each drop.

Suspension of the precipitated resin, was apparently complete, until the addition

of the tenth or twelfth drop, when minute masses of agglutinated resin were observed floating throughout the mixture; these increased in size and number until apparently the greater part of the resin-content of the tincture was thrown out of solution.

The results obtained in this experiment prompted the following:

Experiment No. 2.—Three fluid ounces of distilled water were introduced into another four-ounce prescription bottle, and in this case, the procedure was the reverse of experiment No. 1, the entire one-half fluid dram of the tincture of benzoin being rapidly delivered upon the surface of the water contained in the bottle and permitted to rest upon the surface for the period of about five seconds, and then the mixture was vigorously shaken, as before.

The result in this case was the complete suspension of the resin, producing a permanent emulsion which showed no sign of change after the period of ten days.

More recently, in making a practical application of the result of these experiments, I find that as much as one and one-half fluid ounces of tincture of benzoin, may be delivered into the volume of twelve fluid ounces of water, in the manner described in experiment No. 2, and, if immediately incorporated with an equal volume of glycerin, a white and permanent emulsion will result.

Naturally, when a new or strange condition is observed, the question arises in the mind of the investigator, "What is the cause," and his hypothesis, then formed, will frequently assume a working phase which will lead him into a rational procedure, which will finally result in the solution of his problem.

I am not in a position at present to give the results of a systematic scientific investigation, but I have nevertheless formulated an opinion which may be of service to some other investigator, and help him to the solution of a problem of perhaps greater importance.

It is a well known fact that when alcohol is mixed with water, there is an immediate evolution of heat, which in the terms of physical chemistry, is the "Heat of solution," and is of positive sign (exothermic).

It is also known that water is porous, as has been demonstrated both by physicist and chemist, in recent years.

Now, in the case of experiment No. 1, the nuclei or minute sub-division of resin, as quickly as they are formed, are subjected to the influence of the heat of solution referred to; their surfaces becoming areas of adhesion, and, as their number increase with each successive drop, the subsequent agitation to which they are subjected has the effect of bringing the particles closer together. The element of time now intervenes, and, as they have increasingly shorter distances to travel,—their surfaces being still thermally affected,—they adhere, to form the masses observed in the experiment.

In the case of experiment No. 2, owing to the sudden development of the heat of solution, the inter-spaces of the water are thermally affected to the extent that numerous and infinitely small channels or tubes are created at the surface, into which the resin is temporarily deposited, which again, when vigorously shaken, are broken up into infinitely small particles, whose comparatively limited area are suddenly chilled, and thus rendered incapable of adhesion. Hence, a permanent suspension of the resin.