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A COMPARATIVE PRECIPITATION METHOD FOR THE QUALITATIVE IDENTIFICATION OF EACH OF THE COMMON GUMS.

BY WALTER WEINBERGER* AND MORRIS B. JACOBS.†

The common gums are rapidly attaining a wide use in commerce. With the exception of a number of specific tests for tragacanth, there is no easy, rapid and definite method for the differentiation of one gum from another.

We found, by use of the following method, that the precipitate given by any one of the gums when precipitated from an aqueous solution by alcohol was distinctly different than that given by any other gum.

A 1% test solution of each gum was made, except for agar-agar and Indian gum in which case a more dilute solution was made. To 20 cc. of the test solution, 70 cc. of 95% alcohol was added drop by drop, with constant stirring until precipitation was complete. The texture, quality and the characteristics of the precipitate, as well as the point at which definite precipitation began, were noted.

The gums used were acacia, tragacanth, Irish moss, quince seed, Indian gum and agar-agar. Acacia, tragacanth and agar-agar dissolved directly in the required amount of water. Two Gm. of Irish moss, obtained as the seaweed, were placed in 100 cc. of water and allowed to stand on the steam-bath for one hour. The swelled mass was filtered by pressure through flannel and the resulting filtrate was used as the test solution. Indian gum was permitted to stand on the steam-bath for four hours and the upper layer was used as the test solution. One Gm. of ground quince seed was placed in 100 cc. of water and allowed to stand for one hour on the steam-bath. It was then filtered through filter paper and the filtrate was used as the test solution.

The experiments were then repeated on test solutions of different concentrations and similar results were obtained. In no case could the precipitate given by one gum be confused with that given by any other gum.

A description of the behavior of each precipitate follows and a table, in which the differences in the precipitates may be seen at a glance, is appended. The terms, cloudy and clear, as applied to the supernatant liquid, indicate its appearance after the alcohol solution has been standing for four hours.

Acacia.—When 40 cc. of the alcohol had been added a very fine, flocculent precipitate appeared which became more dense on further addition of alcohol. It settled very slowly leaving a cloudy supernatant liquid. It distinctly did not adhere to either the stirring rod or the beaker.

Tragacanth.—When 10 cc. of alcohol had been added a precipitate first ap-

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peared. On the further addition of alcohol, it took its final form, coagulated and very stringy. When examined apart from the solution the precipitate was bluish white and opaque. It was very adherent, forming a tail on the stirring rod when the rod was lifted out of the solution and clinging to it tenaciously until it slipped off by the force of its own weight. It did not adhere to the sides of the beaker. It settled rapidly leaving a clear solution.

Irish Moss.—When 20 cc. of alcohol had been added a light, stringy precipitate became visible. At 45 cc., the precipitate took its final form, coagulated, stringy, and when examined apart from the solution seemed a translucent jelly. It was somewhat adherent to both the stirring rod and the sides of the beaker. It settled not very rapidly and clear. It could easily be differentiated from tragacanth.

Agar-Agar.—At 20 cc. a flocculent precipitate appeared. It coagulated into large flocs when 40 cc. had been added. At the surface of the solution, the precipitate adhered to the sides of the beaker and the stirring rod, forming a meniscus. The final precipitate was very heavy. It settled evenly, leaving a cloudy supernatant liquid. The precipitate was opaque in solution but transparent when examined by itself.

Indian Gum.—A precipitate first appeared at 15–20 cc. The precipitate was very fine. It was composed of small filamentous particles which on further addition of alcohol formed narrow flakes. The precipitates settled on standing leaving a clear supernatant liquid. It was distinctly non-adherent.

Quince Seed.—At the addition of 25 cc. of alcohol the precipitate first appeared. When 50 cc. had been added a coagulated, stringy, dense precipitate was the result. The precipitate was opaque. It settled on standing, leaving stringy bunches at the bottom of the beaker and a pronounced cloudy supernatant liquid. The precipitate was non-adherent.

TABLE.

Gum.	Point of definite pptn.	Texture of precipitate.	Appearance.	Manner of settling.	Adherent quality.
Acacia	40 cc.	Very fine flocculent		Slow and cloudy	Did not ahdere to either rod or beaker
Tragacanth	10 cc.	Coagulated, long and stringy	Opaque	Rapidly and clear	Adhered persistently to rod alone, formed a tail when lifted out of solution
Irish moss	20 cc.	Coagulated and stringy	Translucent	Not very rapidly and clear	Adhered to both rod and beaker, did not form tail, almost as adherent as tragacanth
Agar-agar	20 cc.	Heavy flocculent	Translucent	Evenly leaving cloudy solution	Adhered, just at surface to both beaker and rod forming a meniscus
Indian gum	15–20 cc.	Very fine filamentous particles		Clear	Non-adherent
Quince seed	25 cc.	Coagulated, short and stringy	Opaque	Settled stringy bunches leaving cloudy solution	Non-adherent

From our experiments, we found, as the above descriptions and table indicate, that each gum, when precipitated from an aqueous solution by alcohol, gives a characteristic precipitate. This characteristic precipitate is easy to recognize and, consequently, gives a valuable index and, in most cases, definite knowledge as to which gum was in solution. The above method is an easy, rapid and definite method for the differentiation of one gum from another.

FACTORS INFLUENCING CALCIUM BALANCE.*

I. INFLUENCE OF POTENTIAL ALKALINITY ON THE UTILIZATION OF SUPPLEMENTARY CALCIUM LACTATE IN THE MATURE RAT.

BY VERSA V. COLE,[1] JOHN H. SPEER AND FREDERICK W. HEYL.

It is generally accepted that the path of excretion of calcium is influenced by the intake of other salts, due to their influence either upon absorption from the gut or to their influence upon retention in the tissues.

Mendel and Givens (1), working with dogs, found that the addition of 6.5 Gm. of sodium bicarbonate per day had no significant effect upon the calcium balance. They report also that large doses of sodium bicarbonate (40 Gm. per day) did not decrease the urinary output of calcium in a diabetic man. Sato (2) studied the effect of alkali on the retention of calcium in infancy, using doses of 2 and 3 Gm. of sodium bicarbonate added to milk. He came to the conclusion that it produced a distinctly unfavorable effect upon calcium balance.

The unfavorable influence of alkali used as sodium bicarbonate on the calcium balance is perhaps due to its influence in limiting the absorption of calcium and phosphorus in the gut by raising the p_H and converting the calcium into relatively insoluble salts in the upper small intestine. It is stated by Zucker and Matzner (3) that the p_H of the intestinal contents of rachitic rats tended to be alkaline, and alkaline feces were obtained. Babbott, Johnston and Haskins (4) note the influence of gastric acidity upon the absorption of calcium. Conditions of hypoacidity are said to reduce the absorption of calcium (5).

It may well be, therefore, that the measurements heretofore reported on the influence of alkaline bicarbonates on calcium balance may be a composite result of an unfavorable influence in the gut which conceals any favorable influence which the potential alkalinity of the bicarbonate might have produced.

Indeed where experimental study on calcium retention has considered the influence of alkalinity and has secured this without alkaline bicarbonates, favorable influence on positive calcium balances have been reported. Thus Bogert and Kirkpatrick (6), studying the effect of base-forming diets upon calcium metabolism, found that, while acid-forming diets caused a marked increase in urinary calcium, base-forming diets produced a decided diminution in urinary calcium. Re-

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* Scientific Section, A. PH. A., Portland meeting, 1928.

[1] Holder of the Upjohn Coöperative Fellowship at Kalamazoo College (1927–28). This paper is based upon the thesis presented by Miss Cole to the Faculty of Kalamazoo College, in partial fulfilment of the requirements for the degree of Master of Science.