

QUICK TEST for "BUDDY" FLAVOR in MAPLE SIRUP

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U. S. Department of Agriculture

In the spring when the daily average temperature rises well above freezing, the buds on the trees, including the sugar maple, begin to swell, indicating that the period of winter dormancy has ended. In the case of the sugar maple, the "sweet water" that the maple-sirup producer has been collecting begins to change in chemical composition to that of the sap of the actively metabolizing plant in the summer. Compounds begin to occur in the sap, which impart the unpalatable "buddy" flavor to sirup made from it. The specific chemical compound or compounds responsible for the buddy flavor are not known, but chemical analysis shows that the total nitrogen and the amino nitrogen content of the buddy sap and sirup is many times that of sap from which good maple sirup is made.

Based on laboratory experiments, the ninhydrin color reaction used to detect the amino group can be used to indicate the presence of the compounds giving buddy flavor to sirup. Stable forms of the ninhydrin reagent, commercially available as aerosols, are sufficiently sensitive to detect buddiness. A procedure, therefore, has been developed to test maple sirup for buddy flavor.

Equipment

1. 1-ounce (30 ml.) screwcap bottle - to hold the standard amino nitrogen solution
2. Wooden toothpicks
3. Test papers - filter paper cut into strips 1/2 by 4 inches

Reagents (See Sources of Supply later in text.)

1. Amino nitrogen standard - Dissolve 5 grams of leucine (an amino acid) in 30 ml. of water, or place 1 level teaspoon of leucine in the 1-ounce bottle and fill it to the neck with water.
2. Ninhydrin spray - commercially available in aerosol spray can.

Procedure

1. To a small volume of the sirup to be tested, add an equal volume of water and mix thoroughly.
2. Make three dots with a pencil, 1 inch in and 1 inch apart, down the center of the test strip of paper. Label X, S, and W. respectively.
3. Using a toothpick, dip the broad end into the diluted sirup and transfer a drop to the pencil dot at the top of the paper, labeled "X, " holding the toothpick in a vertical position.
4. Using fresh toothpicks, likewise transfer a drop of the standard amino nitrogen solution to the dot at the center of the paper, labeled "S, " and a drop of water to the dot at the botton, labeled "W. " The size of the wetted spots should be about the same.
5. Lay the paper on a clean, dry surface (piece of filter paper) and allow the spots to dry at room temperature.

6. Spray the entire paper strip with the ninhydrin reagent. Thoroughly wet the paper but not enough to cause the reagent to run.

7. Dry the sprayed paper at room temperature.

8. Heat the paper at 175° to 195° F. for approximately 1 minute to hasten the development of the color. The lid of a boiling kettle or other moderately hot surface will suffice. (If heat is not used, 1 to 2 hours will be required for development of color at room temperature.)

9. The development of a violet color constitutes a positive test.

Notes

1. The violet color of spot "X," representing the sample, need not be as strong as that of spot "S," the standard, to be a positive reaction, but it should be pronounced enough to be identified when compared to the color developed with water, spot "W."

2. The standard amino nitrogen solution is used to indicate that the ninhydrin reagent is reacting properly to give violet color with amino compounds.

3. Some practice will be required to perform the test satisfactorily. Once the procedure has been established to produce the best color test for the particular commercial ninhydrin reagent, it should be closely followed. This is especially true of the time and temperature of heating the sprayed test strip.

4. This test may also be applied to maple sap but with limitations. A strong positive test means that the sap will produce buddy sirup. However, a sap giving a negative test (no color) may or may not produce a sirup with slight buddy flavor. This is due to the fact that in sap the amino compounds are only one-fortieth as concentrated as in sirup and may be too dilute to give a positive test, even though the sap when concentrated to sirup will yield a buddy flavor.

5. For sirup, the test will serve to identify buddy sirups and differentiate this flavor from other off-flavors.

6. Ninhydrin reagent is a very sensitive stain. Care must be taken to keep the paper test strips clean. Handling the test strip with forceps, especially after staining, will prevent fingerprints, which could produce false colored spots. The papers are best sprayed by hanging them in an open cardboard box to prevent discoloration of other objects by the ninhydrin spray. The ninhydrin reagent is not stable and should be replaced at least every 6 months. Always start with a fresh supply of the reagent at the beginning of each sirup season.

Sources of Supply ^{1/}

1. Leucine

- a. Fisher Scientific Co., Pittsburgh 19, Pa.
- b. Distillation Products Industries, Eastman Organic Chemicals Department, Rochester 3, N. Y.
- c. Nutritional Biochemicals Corporation, Cleveland 28, Ohio

The dry leucine will keep indefinitely in tightly capped bottles, but the standard solution must be made each season.

2. Ninhydrin reagent, in aerosol spray form

- a. Sigma Chemical Co., St. Louis 18, Mo.
- b. Research Specialties Co., Richmond, Calif.

^{1/} Mention of commercial products or companies in this publication does not constitute an endorsement of them by the U. S. Department of Agriculture over other products or companies of equal usefulness for the same purpose.