

Color Changes in Chlorophyll

Why does spinach often change from a bright green to an unappetizing gray-green when it is cooked? Cooking releases certain acids in spinach and other green foods that changes the color of chlorophyll. The color change can be prevented by “buffering” the acids that are released. One way this can be done is with baking soda (sodium bicarbonate). However, sodium bicarbonate destroys the cellular structure of plants and results in a “mushy” food; it also destroys thiamin, one of the B vitamins. Therefore, adding baking soda to green foods to help stabilize the color is not recommended. Another way to preserve the color is to use milk as a buffer.

Materials and Equipment

- 2 cups fresh, washed spinach
- 1 cup milk

- 1 cup water
- a slotted spoon
- 2 saucepans
- a measuring cup
- a white plate

Procedure

1. Put 1 cup of milk in one saucepan and 1 cup of water in the other saucepan.
2. Heat the liquids over low heat until they begin to simmer (steam will be rising from the liquid, but the liquids should not be boiling.) Drop a few leaves of spinach into each pan. Continue cooking over low heat for 4-5 minutes. Do not allow the liquids to boil. Turn off the heat and leave the

spinach in the liquids for another 4-5 minutes.

3. Remove the spinach from the liquids with the slotted spoon and place it on a white plate so that you can compare the colors of the cooked spinach. Add a few leaves of the raw spinach to the plate so you can compare the cooked spinach to the raw spinach.
4. Have the colors changed with cooking? Which of the cooked spinach samples is more gray?

From: “Science Experiments You Can Eat,” Vickie Cobb, J.B. Lippincott Company, 1972.

