

STUDENT ACTIVITY GUIDE

Effect of Curing on Meat Color

Historically, salt (sodium chloride, NaCl) was used for the preservation of meat. The resulting product was usually gray in color unless the salt happened to be contaminated with sodium nitrate (NaNO₃). In this case, the meat developed the characteristic red color which we presently associate with cured or processed meats such as ham, bacon, hot dogs, and bologna. We now know that nitrate was reduced to nitrite before the color change happened. So now nitrite is used directly, resulting in a more-controlled process.

The curing process for meats involves introduction of the curing materials (salt, sugar, nitrite, ascorbates, spices) into the product, either by injection, which is the case with hams or bacon, or by direct addition to the ground-meat mixture, which is the case with various sausage-type products such as hot dogs.

After initial processing, these meats are heated and often smoked to develop a characteristic flavor and color.

In this experiment, you will observe the differences in color between fresh red meat with and without sodium nitrite (NaNO₂) added, and observe the changes in each after heating.

MATERIALS REQUIRED

Raw hamburger
150-mL beakers
Sodium nitrite
Plastic bag
Hot-water or steam bath

EXPERIMENTAL PROCEDURE

1. Divide 200 g of freshly ground hamburger into two batches of 100 g each.
2. Put one of the batches of hamburger into a plastic bag and add 0.016 g of NaNO₂; your teacher will explain how to do this. Mix thoroughly by kneading the bag for about 3 minutes.
3. Stuff each batch of hamburger into a beaker. Pack it down tightly to get rid of as much air as possible. Cover the beakers with a piece of wax paper or a watch glass and label them "With nitrite" and "Without nitrite."
4. Examine and record both the surface color and the interior color of each sample. **Do not taste either of the samples.**

5. Place the beakers in a refrigerator overnight.
6. The next day, remove the beakers from the refrigerator and again examine the surface and interior colors.
7. Cook the meat by heating the beakers over a steam bath or in a boiling water bath for 15–20 minutes, then again examine the surface and interior colors.
8. Record your observations in the table provided.

QUESTIONS

1. What effect does the addition of sodium nitrite to fresh meat have on the color before and after cooking?
2. The legal maximum level of nitrite in a finished product is 156 ppm. How much sodium nitrite can you legally add to 1 kg of meat?
3. Which of the samples after cooking most closely resembles ham or sausage?
4. Which of the cooked samples do you prefer as ham?

5. Would you purchase meats processed without nitrites? Why?

DATA TABLE

	Color			
	Control (no nitrite)		Experimental (with nitrite)	
Time	Surface	Interior	Surface	Interior
Before storage				
After storage				
After cooking				