

## CHAPTER 11. TESTS FOR ENZYMES IN MEAT AND MEAT PRODUCTS

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## 11.1 Catalase Test

## 11.11 Introduction

Tests for catalase in meat are limited to products that have been given a heat treatment since the enzyme normally is present in all raw meat. It is particularly useful for roast beef. This procedure will detect under-processing when the product is scheduled to be heated to 145°F (62.8°C) or higher internal temperature. Tests for catalase in cooked beef are indicative of the presence of somatic catalase. Somatic catalase is destroyed at approximately 145°F and the test indicates whether or not temperatures higher than 145°F were reached.

Detection of catalase in a canned meat product could be indicative of flat sour spoilage. At canning temperatures all somatic catalase should be destroyed, and the presence of the enzyme in a freshly opened can is indicative of bacterial catalase produced by growth.

## 11.12 Equipment and Supplies

- a. Clean plastic teaspoon
- b. Clean paper towels
- c. Felt-tip marking pen
- d. Adhesive tape or paper labels
- e. Whirl-Pak® clear plastic bags (3" x 4")
- f. Clear plastic Zip-Loc® bags (12" x 12")
- g. Clean and sanitized slicing knife
- h. Clean and sanitized large spoon or spatula
- i. 3% Hydrogen Peroxide - 1 pint
- j. Baby Shampoo
- k. Active dry baker's yeast

## 11.13 Procedure

- a. Preparation of the Peroxide Reagent
  - i. Remove the caps from both the peroxide and the shampoo bottles.

- ii. Add one teaspoonful of the shampoo to the pint of hydrogen peroxide (peroxide reagent).
  - iii. Replace the caps securely on each bottle.
  - iv. Slowly invert the peroxide reagent bottle 3-4 times to mix the contents.
  - v. Label the reagent bottle "Prepared Reagent" followed by the date of preparation.
  - vi. Store the peroxide reagent in a refrigerator, the unused shampoo can be stored on a shelf with the chemicals.
- b. Testing the Peroxide Reagent
- i. Label a 3" x 4" Whirl-Pak® bag "Reagent Test".
  - ii. Carefully open the Whirl-Pak® bag and pour approximately 10 granules of the baker's yeast into the bag.
  - iii. Hold the Whirl-Pak® bag upright and pour approximately ½ inch of the peroxide reagent into the bag.
  - iv. Securely hold the top of the bag with the fingers of one hand and securely hold the bottom of the bag with the fingers of the other hand. Position the bag so that the fluid/foam level in the bag is aligned along the edge of the work surface. Keep the bag pressed against the edge of the work surface. Carefully pull the bag downward toward the open end to expel all excess air from the bag. Fold the top over several times and secure it with the built-in clips.
  - v. Securely replace the cap on the peroxide reagent bottle and then use it to support the upright "Reagent Test" bag.
  - vi. Record the time and then add 5 minutes to it for the "Read Time".

- vii. At the read time note whether the bag has abundant foam and is somewhat inflated (Positive Test) or non-foamy and flat (Negative Test). Record this information in the appropriate Quality Control Log. If the peroxide reagent gives a positive test, proceed to the product test, if otherwise, prepare a fresh aliquot of the peroxide reagent first.
- c. Roast Beef Cooking Temperature Test
- i. Prepare the product for sampling and secure a clean sanitized (145°F + hot water) slicing knife. Dry the knife with a clean, preferably sterilized, paper towel.
  - ii. Wipe the knife and slicing surface with a 5% hypochlorite solution.
  - iii. Make a slice through the roast beef at the thickest part of the sample (maximum circumference). Examine the two halves to see if there are areas that appear to be more rare than others.
  - iv. Label a Whirl-Pak® bag with the sample identification number and then carefully open it.
  - v. Cut a ¼ inch thick slice from one of the surfaces, lay it down on a sterile surface and carve out a 1" square section from what appears to be the least cooked area of the slice. Using the knife blade, transfer this 1" square to the Whirl-Pak® bag.
  - vi. Shake the bag to transfer the piece to the bottom of the bag. Cover the piece with Peroxide Reagent and proceed according to steps b. iv through vi, with the exception that the reaction time between the reagent and the sample is extended to 15 minutes.
  - vii. Record the results on the form that accompanied the sample and proceed as you would with any other positive or negative official sample.

d. Canned Product

- i. Label a 12" x 12" zip-lock® bag with the appropriate sample identification number. Do the same for a 3" x 4" Whirl-Pak® bag.
- ii. Aseptically open the suspect can and transfer the contents to the large zip-lock® bag. It may be necessary to use a clean and sanitized large spoon or spatula to facilitate this transfer.
- iii. Carefully close the zipper, expelling all air in the process.
- iv. Carefully manipulate the contents of the zip-loc® bag in a manner to thoroughly mix the contents.
- v. Carefully open the zip-loc® bag, and using a clean, sanitized teaspoon, remove a level spoonful of test material from the bag and transfer it to the Whirl-Pak® bag. Reseal the zip-lock bag and set it and the empty container to one side for possible future use.
- vi. Add peroxide reagent to the Whirl-Pak® bag with the sub-sample to completely cover the sample and the peroxide reagent fills the bottom third of the bag. Use the teaspoon to evenly disperse the sub-sample throughout the reagent.
- vii. Quickly fold the top of the bag four times the width of the tab tape and secure with the side tabs. Proceed according to steps b. iv through vi, with the exception that the reaction time between the reagent and the sample is one minute.
- viii. Allow the sample test bag to stand undisturbed for an additional 15 minute period and then make a final reading.
- ix. Record the results on the form that accompanied the sample and proceed as you would with any other positive or negative official sample.

## 11.2 Selected References

Glenister, P. R., and M. Burger. 1960. A method for the detection of chill-proofer protease in beer. Proc. Amer. Soc. Brewing Chem.:117.

Moreau, J. R., and E. C. Jankus. 1963. An assay for measuring papain in meat tissue. Food Technol. 94:1048.

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