

Filter Paper as a Source of Error in the Determination of Nitrite in Meat

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Samples of filter paper were found which contain sufficient nitrite to cause significant error in determining the nitrite content of cured meat products by the official AOAC method. Six of 28 boxes of filter paper examined were contaminated with nitrite. All 6 contaminated boxes were the same brand and grade. These samples of filter paper could contribute from 4.6 to 18.4 ppm nitrite to the amount of nitrite analyzed for in meat.

The nitrite content of cured meats is most commonly determined in the United States by the official AOAC method (1). This method requires filtration of the heated, dilute meat sample prior to the addition of Griess reagent, which reacts with nitrite to form a brilliant pink azo compound. The absorbance of this compound is used to calculate the amount of nitrite present.

During routine nitrite analysis of cured meat, we found samples of filter paper that contained sufficient nitrite to cause significant error in the quantity of nitrite determined. The extent of the error due to filter paper was investigated and the results are reported here.

Experimental

Twenty-eight boxes of filter paper were obtained from various locations at the Center. They were identified as: Brand A, grade 1—2 boxes, grade 2—13 boxes, grade 3—2 boxes, and 1 box of each of 5 additional grades of Brand A. Also examined were Brand B, grade 1—2 boxes, grade 2—1 box; Brand C, grade 1—1 box; Brand D, grade 1—1 box, and grade 2—1 box. The papers were of various sizes and no attempt was made to correlate the amount of nitrite from the filter paper with the diameter or weight of the paper.

Forty ml water was filtered through the paper. Four ml Griess reagent was added to the filtrate and color was allowed to develop 30 min (2). Concentration of nitrite was determined as described in the AOAC method (1).

In preparing the Griess reagent, Cleve's acid (1-naphthylamine-7-sulfonic acid) was substituted for 1-naphthylamine, since the safety of the latter has been questioned.

Results and Discussion

Twenty-eight boxes of filter paper were examined; 6 were found to be positive for nitrite. All 6 positive samples were Brand A, grade 2 filter paper. An additional 7 boxes of the same brand and grade filter paper were found to be negative.

Table 1 shows the concentration of nitrite found in water filtered through 13 samples of Brand A, grade 2 paper. The concentration ranges from 0 to 0.092 ppm nitrite.

The potential error in the amount of nitrite determined in meat that could be contributed by filter paper was calculated by the following equation:

$$C_P = C_A \times 100 \times 2$$

where C_P = potential concentration of nitrite; C_A = concentration of nitrite in water filtered through the paper; 100 = initial meat sample dilution recommended in the nitrite procedure; 2 = common dilution factor of the aliquot tested for the colorimetric step in the procedure. The potential error that could be introduced by the filter paper is also shown in Table 1.

Five of the 6 boxes of contaminated paper were obtained, already opened, from 3 laboratories. The remaining unopened box was obtained from the chemistry supply room. The sample from the sealed box had the second highest nitrite level, 0.051 ppm.

We contacted the distributors of Brand A products but they could suggest no reason why such

Table 1. Concentration (ppm) of nitrite in filtrate from samples of Brand A, grade 2 filter paper and sample calculation of error

Sample	Found	$\times 200^a$
1	0.092	18.4
2	0.028	5.6
3	0.023	4.6
4	0.032	6.4
5	0.023	4.6
6	0.051	10.2
7-13	n.d. ^b	0

^a See text for explanation of this factor.

^b None detected.

a large percentage of the grade 2 paper should be contaminated with nitrite.

It is possible that oxides of nitrogen in air might have contaminated the paper and were being analyzed as nitrite. Therefore, in 2 different laboratories, air was sucked through uncontaminated sheets of Brand A, grade 2 paper in Büchner funnels for 8 hr. The papers tested negative for nitrite.

Based on these findings we suggest that any box of filter paper used in the determination of nitrite should be tested for nitrite contamination. This can be done by analyzing 3 or 4 sheets of

paper, at random, throughout the box. If any of the sheets are positive, none of the sheets from the box should be used for nitrite analysis.

Determination of a filter paper blank may not be sufficient because we have found different sheets from the same box varying widely in nitrite content. For example, 2 contiguous sheets from one box yielded 0.064 and 0.092 ppm nitrite, respectively.

REFERENCES

- (1) *Official Methods of Analysis* (1970) 11th Ed., AOAC, Washington, DC, secs. 24.014–24.015
- (2) Nicholas, R. A., & Fox, J. B., Jr. (1973) *JAOAC* 56, 922–925