Passage VII

Salts containing nitrite ions (NO_2^-) are often added to meats to prevent discoloration caused by air and bacterial growth. Use of NO_2^- is controversial because studies have linked NO_2^- with cancer. Students performed 2 experiments to measure NO_2^- levels.

Experiment 1

Four solutions, each containing a different amount of $NaNO_2$ (a salt) in H_2O were prepared. A coloring agent was added that binds with NO_2^- to form a purple compound that strongly absorbs light of a specific wavelength, and each solution was diluted to 100 mL. A *blank* solution was prepared in the same manner, but no $NaNO_2$ was added. A *colorimeter* (a device that measures how much light of a selected wavelength is absorbed by a sample) was used to measure the *absorbance* of each solution. The absorbances were corrected by subtracting the absorbance of the blank solution from each reading (see Table 1 and Figure 1).

Table 1

Concentration of NO_2^- (ppm*)	Measured absorbance	Corrected absorbance
0.0	0.129	0.000
1.0	0.282	0.153
2.0	0.431	0.302
4.0	0.729	0.600
8.0	1.349	1.220

*ppm is parts per million

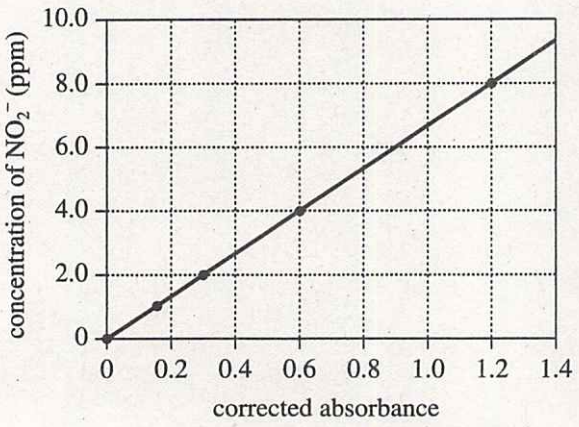

Figure 1

Experiment 2

A 100 g meat sample was ground in a blender with 50 mL of H_2O and the mixture was filtered. The blender and remaining meat were then washed with H_2O, these washings were filtered, and the liquid was added to the sample solution. The coloring agent was added and the solution was diluted to 100 mL. The procedure was repeated for several meats, and the absorbances were measured (see Table 2).

Table 2

Meat	Corrected absorbance	Concentration of NO_2^- (ppm)
Hot dog	0.667	4.4
Bologna	0.561	3.7
Ground turkey	0.030	0.2
Ham	0.940	6.2
Bacon	0.773	5.1

35. Based on the results of Experiment 1, if the concentration of NO_2^- in a solution is doubled, then the corrected absorbance of the solution will approximately:

A. remain the same.
B. halve.
C. double.
D. quadruple.

36. A sample of pastrami was also measured in Experiment 2 and its corrected absorbance was determined to be 0.603. Which of the following correctly lists bologna, bacon, and pastrami in *decreasing* order of NO_2^- concentration?

F. Bologna, bacon, pastrami
G. Pastrami, bacon, bologna
H. Bologna, pastrami, bacon
J. Bacon, pastrami, bologna

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37. Based on the results of Experiment 1, if a solution with a concentration of 1.5 ppm NO_2^- had been tested, the corrected absorbance would have been closest to which of the following values?

A. 0.15
B. 0.23
C. 0.30
D. 0.36

38. If Experiments 1 and 2 were repeated using a different coloring agent that produces a different color when it binds with NO_2^-, then which of the following changes in procedure would be necessary?

F. The new coloring agent should be added to the blank solution, but not to the sample solutions.
G. Both of the coloring agents should be added to the blank solution and to all of the samples.
H. The absorbance of the blank solution made with the new coloring agent should be added to the measured absorbances.
J. The colorimeter should be set to measure at a different wavelength of light.

39. Based on the results of Experiments 1 and 2, if the measured absorbances for the meats tested in Experiment 2 were compared with their corrected absorbances, the measured absorbances would be:

A. higher for all of the meats tested.
B. lower for all of the meats tested.
C. lower for some of the meats tested, higher for others.
D. the same for all of the meats tested.

40. If some of the water-soluble contents found in all of the meats tested in Experiment 2 absorbed light of the same wavelength as the compound formed with NO_2^- and the coloring agent, how would the measurements have been affected? Compared to the actual NO_2^- concentrations, the NO_2^- concentrations apparently measured would be:

F. higher.
G. lower.
H. the same.
J. higher for some of the meats, lower for others.

END OF TEST 4

STOP! DO NOT RETURN TO ANY OTHER TEST.