E20 The Detection of Sodium Hypochlorite Adulterated Foods and Salsas in a Poisoning Investigation

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Learning Overview: After attending this presentation, attendees will better understand how to investigate a food adulteration in which bleach (sodium hypochlorite) was used as the adulterant. The goal of this presentation is to provide information to the scientist who may have to conduct future bleach-tampering investigations.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by showing methodology that the scientist can use to detect and verify the presence of bleach and its breakdown products in difficult food matrices. This methodology can also be applied to other scenarios in which bleach has been used in a crime.

Two people were hospitalized after eating at two separate open food bars. Video footage at one of the food bars showed a man with a backpack putting an unknown substance on and in several food items. The man was later arrested by police and found to have a caustic bleach-containing product in his possession. This product was believed to have been used in the incident that caused injuries to the two people. Several samples of salsa and Chinese chicken entrees were analyzed by the United States Food and Drug Administration's (FDA's) Forensic Chemistry Center (FCC) and compared to the caustic bleach-containing product from the suspect. Bleach (sodium hypochlorite) is inexpensive, readily available, and found in numerous cleaning products. Household bleach contains between four to six percent sodium hypochlorite. Bleach is caustic, a strong oxidizer, and harmful if swallowed. The determination of the presence of bleach in foods can be difficult due to the instability of bleach in food matrices and interferences from the food with the detection of bleach.

The FCC has previously developed published methodology for detecting bleach (sodium hypochlorite) contamination in suspect beverages. Using these previously established protocols, seven suspect food items, one empty cup rinsed with a small amount of water for analysis, and a suspect adulterant (the caustic bleach-containing product) were characterized for the presence of bleach and bleach breakdown products. Characterization of the samples included the use of two oxidizing agent spot tests, iodometric titration, ion chromatographic analysis, headspace Gas Chromatography/Mass Spectrometry (GC/MS), and Liquid Chromatography (LC) /Charged Aerosol Detection (CAD). With the exception of LC/CAD, these techniques are routinely used at FCC to characterize samples suspected to have been adulterated with bleach or bleach-containing products. LC/CAD analysis has proven useful in providing a surfactant profile of cleaners. In this case, LC/CAD was used to identify surfactant characteristics of the suspect adulterant in comparison with the suspect food items.

Using the established protocol for the detection of adulteration involving bleach, all of the submitted food items were tested. The analyses showed that seven of the items and the caustic bleach-containing product were positive for the presence of oxidizing agents using the acidic diphenylamine and the potassium iodide starch test paper wet chemical tests for oxidizers. One of the food items had quantifiable levels of sodium hypochlorite still present. This food sample was analyzed using iodometric titration to determine its sodium hypochlorite content. Determinations were made as to whether the tested items contained active bleach, evidence to support the presence of bleach at one time, or no evidence to support the presence of bleach at any time.

Bleach, Adulteration, Poisoning

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