



### A13 Determination of Cyanide as an Indicator of Bitter Almonds in a Shipment of Organic Almonds

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After attending this presentation, attendees will see how the detection of cyanide indicated the presence of bitter almonds that had been commingled with sweet almonds.

This presentation will impact the forensic science community by demonstrating how the detection of cyanide can be used to remove potential health hazards from the market, in order to ensure the safety of the food supply.

Several complaints were received from consumers in Washington, who had purchased organic almonds at local stores around August 2010. Although some of the almonds tasted "normal," the consumers indicated that some "tasted very bitter." The original shipment of almonds was declared as a product of Uzbekistan, a region of the world in which bitter almonds grow. This raised the possibility that wild, bitter almonds had been commingled with the sweet almonds that are typically consumed in the United States.

Bitter almonds contain the cyanogenic glycoside amygdalin, which undergoes acid hydrolysis to produce glucose, benzaldehyde, and cyanide. According to the literature, cyanide levels in bitter almonds can range from 4 mg to 9 mg per almond.<sup>1</sup> A minimum lethal dose of cyanide is reported as 0.5mg per kg, or 50mg for a 100kg (220lb) adult. Due to the potential health hazard associated with the ingestion of cyanide through consumption of bitter almonds, samples of the organic almonds were collected and submitted to the Forensic Chemistry Center for analysis. One sample was a bulk bag of almonds, obtained from the store where one of the consumers made his purchase. The second sample consisted of portions taken from pallets of almonds that were placed on hold in the dealer's warehouse. Although bitter almonds are described as being "shorter and rounder" than the sweet almonds with which most U.S. consumers are familiar, the variation in size, shape and color of the organic almonds received made physical separation unreliable.

The results presented will include the detection of cyanide in both ground composites and individual almonds, the optimization of sample extraction protocols for the removal of amygdalin from the product, and the use of amygdalin and cyanide as indicators of the presence of bitter almonds in a bulk shipment of raw organic almonds.

#### Reference:

1. Shragg TA, Albertson TE, Fisher, Jr, CJ. Cyanide Poisoning After Bitter Almond Ingestion. West J Med 1982; 136: 65-9.

#### Cyanide, Amygdalin, Bitter Almonds