STUDY OF MELAMINE IN MILK AND DAIRY PRODUCTS OF LOCAL RAW MATERIALS

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Abstract: This article presents a quantitative analysis of melamine added for adulteration of milk and dairy products produced in Uzbekistan and foreign countries using high-performance liquid chromatography (HPLC) and monitoring the safety of milk and dairy products on market shelves and in the Republic of Uzbekistan. Uzbekistan's compliance with the requirements of the regulatory document in force in the territory is analyzed.

Keywords: Melamine, packaged milk, cheese, chromatography, chromatographic analysis.

The development and intensification of the dairy industry currently often entails the appearance of counterfeit food products in circulation. Component adulteration of milk is widespread in relation to the most valuable protein component. Today, the problem is that the assessment of the amount of protein in milk and its processed products by arbitration methods is based on the determination of nitrogen and is currently imperfect, since when adulterated with nitrogen-containing substances such as melamine, urea gives false inflated values and does not allow for operational incoming and production control.

Today, the demand for milk and dairy products is growing every day. We know that natural milk and dairy products are among the products rich in various nutrients for the human body.

Melamine (see fig. 1) is one of the semi-finished products obtained in the production of plastics. A distinctive feature of this compound is the presence of six nitrogen molecules in it. In dairy production, products containing proteins are

tested for the presence of nitrogen in them. Therefore, Chinese manufacturers added melamine to their products to imitate the high protein content. We are witnessing many cases of adulteration of dairy products by adding various additives, which is becoming a pressing issue not only in our country but also around the world. For example, increasing the amount of protein by increasing the amount of nitrogen in milk and milk. dairy products can be achieved by adding melamine.

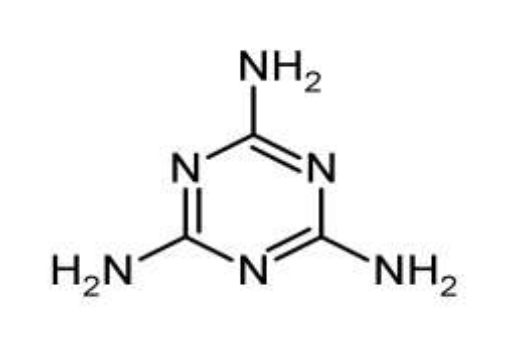

Figure 1 - structural formula of melamine

In foreign countries, including the United States, China, etc., melamine has been found in dry baby foods. Melamine (2,4,6-triamino-1,3,5-triazine, $C_3H_6N_6$) is a type of nitrogen-containing organic compound. Since melamine is not a natural product, it cannot be added directly to food or feed. Many countries have set maximum residue limits based on regulations to protect public health and food safety. For example, the European Union has set a maximum residue limit of 2.5 mg/kg for dairy products and high-protein products, while the United States has set a maximum residue limit of 0.25 mg/kg for dairy products and infant formulas that do not contain melamine. are permitted in the composition of products. In Uzbekistan, the technical regulations for the safety of milk and dairy products also set a standard for the amount of melamine in milk and dairy products. According to it, the content of melamine in all types of milk and dairy products is not allowed.

There are several methods for determining melamine, and in this study, a number of milk and dairy products were studied using high-performance liquid chromatography, cheeses and imported dry milk products intended for baby food

were selected. In the course of the test, a pure standard sample of melamine (purity level X>99.5%), methanol (HPLC grade), acetonitrile (HPLC grade), 3-chloroacetic acid, sodium octane sulfonate (X>99.5%), a solid cartridge for Phase extraction, a 0.22 μm membrane filter, a centrifuge, an ultrasonic water bath and high-performance liquid chromatography (Agilent Technology 1260 Infinity II, VWD), a ZORBAX Eclipse XDB-C8 4.6x150 mm chromatographic column were used.

The following chromatographic conditions are created for the chromatographic analysis:

- Liquid volume sent to the device: 10 μl;
- Eluent A / B: 80/20

a) Eluent A: 10 mmol sodium octane sulfonate solution (pH = 3.3);

b) Eluent B: Acetonitrile;

- Column thermostat temperature: 30 °C.
- Liquid phase flow rate: 1.0 ml/min;
- Wavelength: 240 nm

First, a standard sample of melamine with different concentrations of 0.1; 0.5; 1.0; 2.0; 2.5 mg/l was prepared from standard sample solutions.

Before chromatographic analysis, the time of appearance of the test substance (melamine) on the chromatogram was determined.

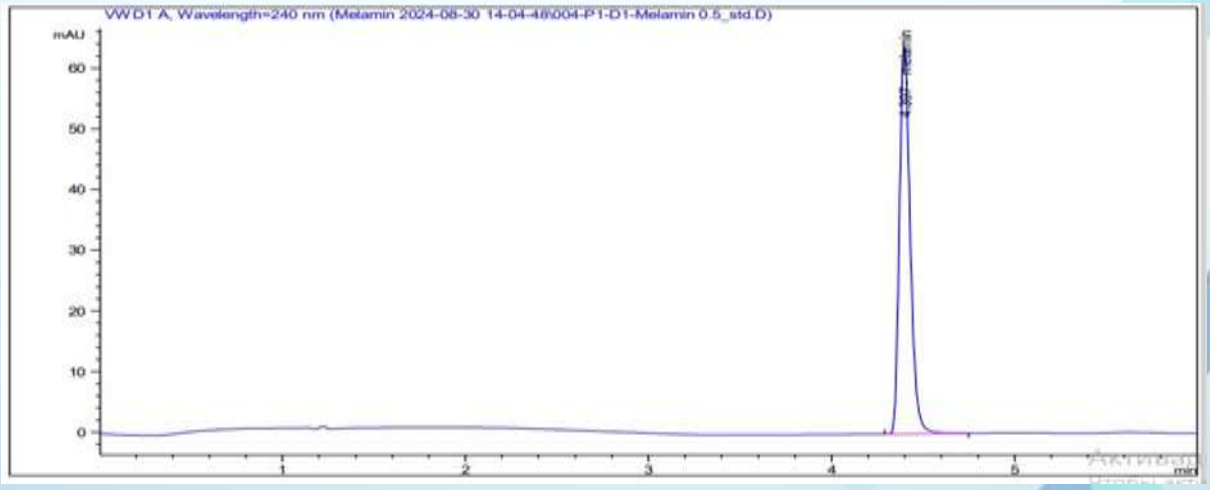

Figure 2 - of the standard sample of melamine 0.5 mg/kg.

According to the chromatogram, it was determined that the release time of the melamine substance is 4.397 min. To quantitatively determine the melamine content in the samples selected for this study, a gradient curve was constructed using the prepared standard samples.

It is well known that milk and dairy products consist of various proteins, carbohydrates and minerals, which leads to the release of foreign substances in the chromatogram for chromatographic analysis. In order to determine the amount of melamine in the samples selected for the study, it is necessary to isolate the melamine substance from the samples.

We take 2.00 grams of our liquid sample (3.2% packaged milk, 0.1% yogurt) and place it in a 50 ml polypropylene test tube, add 5 ml of 5% 3-chloroacetic acid and 2 ml of acetonitrile.

We have analyzed the regulatory framework, scientific publications of domestic and foreign authors, review materials from open sources over the past 10 years on the issues of falsification of the protein component of milk and its processed products, methods of identifying counterfeit components. As a result of the analysis of regulatory documents and scientific literature, we found that the existing methods approved in regulatory documents are labor-intensive to reproduce, require special equipment, personnel training to work on this equipment, the use of chemical reagents and auxiliary equipment, often expensive. A modern method of identifying melamine using infrared analyzers will allow us to establish its quantitative values with great accuracy in the presence of appropriate calibration dependencies, will greatly speed up and simplify the procedure for the delivery and acceptance of raw milk while maintaining quality and safety indicators at a high level in accordance with regulatory documents.

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