Intersections of Faith and Culture: AMERICANJournal of Religious andCultural Studies
Volume 2, Issue4, 2024ISSN (E): 2993-2599

ACUTE POISONING FROM CHEMICALS USED TO DISSOLVE VARNISH AND PAINTS

Z.A. Yuldashev
Tashkent Pharmaceutical Institute.
M.I. Nurmatova
Tashkent Pharmaceutical Institute.
G. N. Ikromova
6th year student of Tashkent Medical Academy. Tashkent city.
e-mail: malohat_nurmatova@mail.ru,
тел. 94-622-06-97

Abstract. The article presents the cases of acute poisoning from the mixture of polyatomic alcohols in the solvent "Razbavitel" in the secretions isolated from the biological object, biological fluid and physical evidence. Microcrystallographic reactions, color-forming reactions, and gas-liquid chromatography methods were developed in the obtained separations. It was observed that the retention time of polyatomic alcohols in the solvent "Razbavitel" in the chromatogram was compared with the samples taken from biological objects and biofluids.

Key words: biological object, biological fluid, poisoning, gas liquid chromatography, microcrystallographic and color reactions.

Importance. One of the toxic compounds that attract attention among the physical evidence submitted to forensic examination today is the solvents used in the dissolution of lacquer paints with various names (Rastvoritel 646, White spirit, Razbavitel universalnyy, Razbavitel universal premium) used in the industry as household appliances [1]. The death of young children is observed due to non-observance of sanitary-hygienic rules and carelessness in their use and storage [2].

The number of decisions and referrals issued by the investigating and investigating bodies to the forensic chemistry department located in the regional branches of the Republican Forensic Medical Expertise Scientific-Practical Center on the examination of the internal organs of the corpses that were heavily poisoned and died as a result of artificial organic matter-preserving varnishes and solvents used to dilute paints. is increasing. Taking into account these circumstances, development of methods of chemical toxicological analysis of solvents used in industry as household appliances, especially for dilution of lacquer paints, is one of the urgent tasks facing forensic chemists.

This year, pieces of internal organs (stomach, liver, kidney, small intestine, large intestine), stomach contents and 0.5 l as physical evidence were sent to the forensic chemistry department of the Tashkent regional branch of the Republican Forensic Medical Expertise Scientific and Practical Center. a plastic container, in which 0.5 ml of the liquid used to dissolve varnish and paint solvent ("Razbavitel" varnish and paint) was submitted for forensic chemical analysis. The organoliptic analysis of the presented viscera and physical evidence revealed a significant odor of

a pungent, suffocating, oily substance in the jars containing the viscera, pieces of intestine, and gastric juice.

Purpose of work. Development of methods of chemical-toxicological analysis of toxic substances contained in "Razbavitel" solvent of varnish paints and separations isolated from poisoned biological objects and biological fluids.

Methods and techniques. "Razbavitel" consists of a special solvent for dissolving varnishes and paints (ethanol 65%, butanol 10%, butyl acetate 30%, amyl acetate 18%, ethyl acetate 9%, acetone 3%)[3]. Since these chemical substances belong to the category of volatile poisons, the extraction of toxic substances from biological objects was carried out using a water vapor apparatus [4].

Method I. For this, 100 g of stomach and liver were taken separately from internal organs in a 500 ml clean dry flask on a special scale and finely ground and placed in a 500 ml measuring flask [5]. 200 ml of distilled water was added on top, it was made into a slurry, and the pH of the medium was adjusted to 2.0-2.5 using a saturated solution of oxalic acid. Then, it was lowered into a pre-prepared water bath. The internal organ fragments in the flask containing the biological object were removed using steam. The clear distillate was collected in a clean dry 50 mL flask[6]. Qualitative analyzes of volatile substances from the obtained distillate were carried out.

1. Methyl salicylate ester formation reaction. To carry out the analysis, 1 ml of the tested distillate was placed in a porcelain vessel and mixed with the addition of salicylic acid crystals. After adding 3-4 ml of (concentrated) sulfuric acid, the mixture was heated over low heat, as a result, a characteristic smell of methyl salicylate ether was noticed.

2. Iodoform formation reaction. At the next stage, 1 ml of test distillate was taken in a clean test tube, 1 ml of 1% alkali solution was added dropwise until the mixture turned pale yellow, and 1% iodine in 2% potassium iodine solution was added drop by drop. The mixture was heated in a water bath at 50°C. As a result of the reaction, the smell of iodoform was felt, and a yellow precipitate formed in the test tube within 10-15 minutes. When the precipitate was viewed under a microscope, it was observed that there were hexagonal star-shaped microcrystals.

3. Isonitrile formation reaction. When the test tube was heated by adding 1 drop of aniline solution to the iodoform formed by the above reaction, it was observed that a very foul-smelling substance, isonitrile, was formed.

4. Ethylacetate formation reaction. The analyzes were carried out in a porcelain container. For this, 1 ml of sodium acetate crystals were added to the test solution. A double amount of concentrated sulfuric acid was then added. The mixture was heated in a water bath until air bubbles formed, resulting in a characteristic odor of acetic ethyl ether.

5. Amyl acetate ester formation reaction. 2 drops of concentrated sulfuric acid were added dropwise to the dry residue in a porcelain dish, and a crystal of dried sodium acetate was added to it. When the porcelain dish was slowly heated, an odor of amyl acetate ether was noticed, reminiscent of the smell of sweet pear essence.

6. Reaction involving salicylic aldehyde and concentrated sulfuric acid. For this, 20-25 drops of 1% salicylic aldehyde solution and 3 ml of concentrated sulfuric acid were added to the dry residue in a porcelain container. After the mixture cooled, the plate was heated in a boiling water bath for 3 minutes and a dark red product was observed[3].

Method II. Determination of volatile toxic substances in a biological object by gas liquid chromatography (GSX) method.

Apparatus conditions: Chromatograph Kristallyuks-4000m, column series No. 2905, column size 2.0 m.-2.0 mm, Chromaton N-AW-DMCS. Sorbent phase 7% PFMS-4, SE 30 solid phase. Column

temperature-650 0S, detector-200, isparitel -150, gas transmitter 2cm 3/min -20, writing scale, tape 10 mm/min air cm 3/min -500.0, pressure-1,000 internal standard 0.4% propyl alcohol. Sample delivery volume is 20 µl.

a) 2 ml of 0.4% propanol solution, 2 ml of tested biological fluids (blood and gastric juice) were put into 2 clean and dry penicillin vials for the analysis. 1 ml of the mixture was taken and 0.5 ml of 50% trichloroacetic acid solution was added to penicillin vials in order to precipitate the proteins. Vials were mounted on a special iron fixator. Then, 0.3 ml of freshly prepared 30% sodium nitrite solution was added using a syringe and stirred clockwise for 1 minute. 1 µl of the test sample in the vapor state was taken and sent to the chromatograph dispenser.

b) A 0.5 ml steam sample was withdrawn from the steam part of the jar containing the intestinal fragments using a special microsyringe with a capacity of 1.0 ml and sent to the chromatograph dispenser. The obtained results are presented in Figure 1.

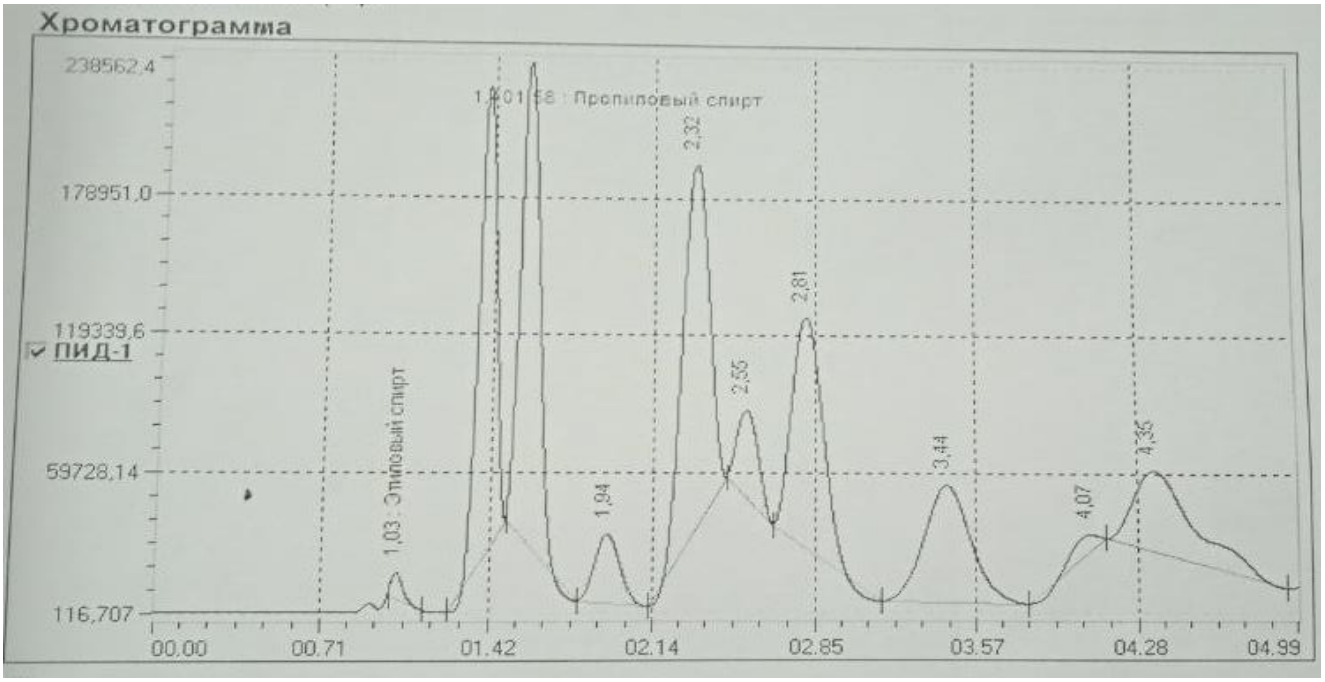

Figure 1. The physical evidence is an exclusion chromatogram from a piece of intestine

As can be seen in the first picture, a vapor sample taken from a jar containing a piece of intestine of a biological object submitted for analysis showed the same retention time as the chromatographic peak height of the standard alcohols placed in the base of the gas-liquid chromatograph bank.

At the next stage, a vapor sample in the amount of 1 µl was taken from the jar containing gastric juice and sent to the dispenser of the chromatograph using a special syringe. The obtained results are presented in Figure 1.

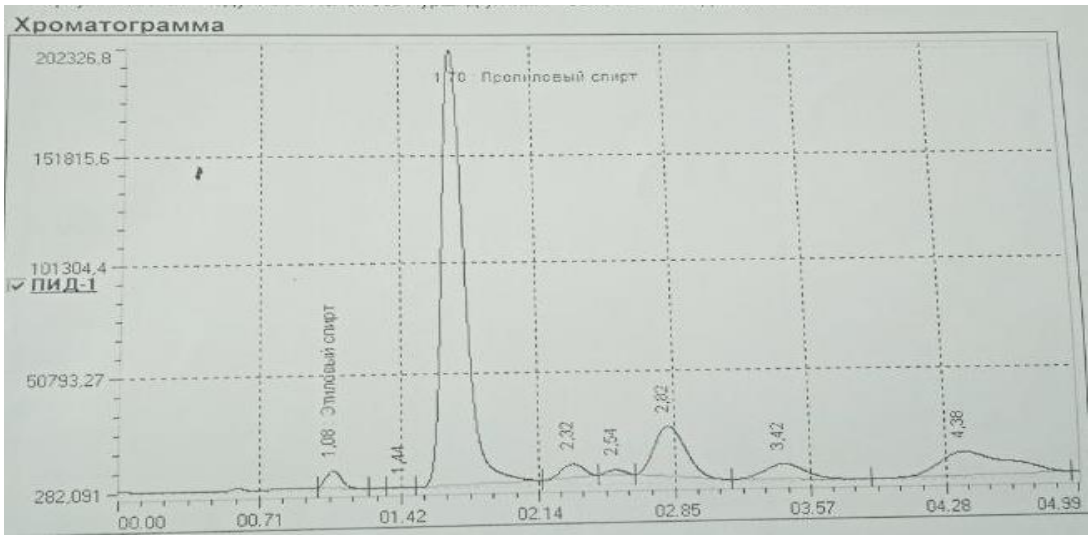

Figure 2. Extraction chromatogram from gastric juice

As can be seen in the above picture, a vapor sample taken from a jar of gastric juice submitted for analysis was observed to produce a chromatographic peak height of the standard alcohols (methanol, ethanol, butanol and amyl acetate) located in the bank base of the gas liquid chromatograph.

Result. Fragments of internal organs (stomach, liver, kidney, small intestine, large intestine) of the corpse named "XXX" brought for forensic chemical examination, and as physical evidence a 0.5 l plastic container containing the solvent for dissolving varnishes and paints "Razbavitel" it was found that polyatomic alcohols (methanol, ethanol, butanol and amylacetate) were present in the isolated extracts.

Conclusion. Microcrystallographic reactions, color-forming reactions, and gas-liquid chromatography methods have been developed from separations extracted from biological objects, biological fluids, and material evidence. It was observed that the retention time of polyatomic alcohols in the solvent "Razbavitel" in the chromatogram was compared with the samples taken from biological objects and biofluids. As a result of the investigations, it was proved that the body named "XXX" was poisoned by the solvent "Razbavitel".

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