

Chemists develop fast technique to identify the products of poisonous substance

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Researchers of MSU Chemistry Department have patented a speedy method to determine compounds remaining after application of phosphorus-containing poisons. Phosphorus-containing compounds are organic molecules containing the carbon-phosphorus chemical bond. The organic compounds of phosphorus are used as insecticides, as medications and as motor oil antioxidants . But some organophosphorous substances are poisons of neural-paralytic action that can cause death within a few hours after contact. Once introduced into the human body, the neural-paralytic poisons block the enzymes responsible for neural impulse transfer. Due to the malfunction of signal transfer, the subject is paralyzed. Such poisons can absorb into the body through the skin or via swallowing or inhalation.

The detection of poisonous agents and the nontoxic products of their decomposition is urgent for the investigation of chemical weapons, and also to diagnose the condition of poisoned people. The basic way to determine a concentration of organophosphorous [substances](#) and the products of their decomposition is [gas chromatography](#), but it requires a sophisticated sample preparation procedure. A faster way is liquid chromatography, but hydrophilic substances like alkylphosphonic acids are difficult to detect because of they are difficult to hold within a chromatography column. As a result, they pass through to quickly to be separated from one from another. Until now, this obstacle has prevented the use of liquid chromatography.

Research fellows of MSU Chemistry Department under the guidance of

Doctor of Science in Chemistry, Professor Grigorij Tsizin have solved the problem of organophosphorous substance liquid separation. They have patented a method of phosphonic acids determination based on the application of a special porous carbon sorbent for liquid chromatography. The scientists have modified the previously created procedure. They suggested washing the chromatograph column with water before testing and to insert the formic acid together with the sample. This technique holds the metylphosphonic and other acids for a longer time in the column, thus increasing the sensitivity of determination of their concentration.

"Our technique is faster than gas [chromatography](#) due to cancelation on derivatization step. The 'exotic' fixed base is required. However, this sorbent is commercially available and allows to get the excellent results," says contributing author Mikhail Statkus. The method may be used in future by specialists investigating the incidents with poisoning substances application.

Provided by Lomonosov Moscow State University

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