СЕКЦИЯ 6

БЕЙОРГАНИКАЛЫҚ МАТЕРИАЛДАРДЫҢ ХИМИЯСЫ МЕН ХИМИЯЛЫҚ ТЕХНОЛОГИЯСЫНЫҢ ЗАМАНАУИ МӘСЕЛЕЛЕРІ

СОВРЕМЕННЫЕ ПРОБЛЕМЫ ХИМИИ И ХИМИЧЕСКОЙ ТЕХНОЛОГИИ НЕОРГАНИЧЕСКИХ МАТЕРИАЛОВ

OPTIMIZATION OF TEMPERATURE OF COLD TRAP FOR UDMH TRANSFORMATION PRODUCTS DETERMINATION IN AIR

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Heptyl is stable and high boiling fuel based on mixture of unsymmetrical dimethylhydrazine (UDMH) and oxidizer, usually nitrogen tetroxide. After launching, rocket carrier falls down and contaminates environment by spilling of unburned fuel into the ground. Due to external conditions such as sunlight, humidity, temperature, soil microflora and plants - unsymmetrical dimethylhydrazine transforms to a number of substances that are dangerous to humans and animals of the local fauna. The main part of those compounds is evaporating and pollutes air.

Determination of UDMH transformation products in air should be performed in the settlements located in proximity to the spaceport, dropping rocket launchers, accidents as well as storage and disposal of rocket fuel. One of the perspective methods for determination of UDMH transformation products in air is thermal desorption coupled with gas chromatography and mass-spectrometry. The method is based on sorption of analytes on sorbent tubes (ST) by sampling air with pump. Then sorbenttube is heated to desorb analytes to the cold focusing trap. After, focusing of analytes cold trap is extremely heated to desorb analytes into gas chromatographs column.

Temperature of cold trap is one of most important parameters of thermal desorption. On the higher temperature, the less substance will be focused on the trap. The amount of substance will affect the sensitivity and quantitative determination of substances.

To optimize the temperature of cold trap a number of analysis were performed with different focusing temperatures. Contaminated samples of air were obtained by injecting of 1 μl solution of UDMH transformation products (N-nitrosodimethylamine, N,N-dimethylformamide, N,N-Dimethylacetamide, 1-methyl-1H-1, 2, 4-triazole,1-methylimidazole)with concentration 10 ng/μl to the ST. Injection of solution to ST was performed by using calibration solution loading rig (Markes International, U.K.). After contamination ST were desorbed and analysed by TD-GC-MS (Unity-XR, Thermo Scientific Trace 1310 GC with Exactive GC Orbitrap)in different temperatures of cold trap: -30, -20,-10,0,10 and 20°C.

Increasing of cold trap temperature from -30 to 0°C leads to negligible changes of the peak area of analytes. Cold trap temperature10 and 20 °C reduces detector response by 35%. Thus, the cold trap temperature 0°C was selected as optimal.