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MIRCOCALORIMETER PERFORMANCE DETERMINATION AND STABILITY DETERMINATION OF NITROCELLULOSE-BASED SUBSTANCES AND THEIR COMPARISON WITH CHROMATOGRAPHIC RESULTS

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Nitrocellulose-based substances are dangerous because of their instability; therefore, stabilizers are added, but due to constant chemical reactions, they are depleted, that's why for safety of everyone involved, nitrocellulose-based substance stability must be tested. In the last few years Latvia started to test its own munition on chemical stability, which was limited to chromatographic methods, but now an opportunity arose to test it with microcalorimetry and in addition compare the obtained results between two methods.

Microcalorimeter performance was determined via two methods, one being internal test and the second one being biphenyl test. Internal test results were in agreement with instrument requirements, whereas biphenyl test showed slight deviation from requirements for one of six microcalorimeters at 1,8 %.

Analysed munition samples, delivered by Latvian National Armed Forces, contained two different stabilisers. First stabiliser was diphenylamine, samples with this stabiliser showed that it would be stable for up to ten years at 25 °C, but one of the samples was nearing its limits. Another stabiliser was centralite I or ethylcentralite. Samples containing centralite I displayed almost no deviation from the baseline, therefore it can be stored and safely used.

The obtained results with chromatographic methods displayed similar results, samples containing diphenylamine displayed slight decrease in stabiliser content after aging, where in one of the samples the decrease was quite extensive. Samples with centralite I displayed almost no decrease in stabiliser content after aging, which was around 0,1%.

Primary author: MEIJERS, Kaspars

Co-author: Dr MEKŠS, Pēteris

Presenter: MEIJERS, Kaspars

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