
GERMAN DEMOCRATIC REPUBLIC

Application of Trace Analysis to Exploit Memory Effects in Challenge Inspections

Introduction

For an effective conduct of challenge inspections, appropriate analytical concepts, methods, and instruments are essential. They will have to combine high specificity and sensitivity with as little intrusiveness as possible. Also, methods used should have a certain capability to provide information about previous activities at the inspected site. Other important features would be portability and reasonable cost.

This working paper briefly describes an approach developed in the GDR's trial challenge inspection in an chemical industry plant (see also the corresponding report which has been submitted as a separate working paper). An attempt was made in this trial to develop sampling and analytical methods for quick on-site verification using a portable ion mobility spectrometer, in order to exploit memory effects of a chemical plant. Investigations are still being conducted to further improve the concept.

1. Development of methods in pre-inspection laboratory experiments

1.1. General Information

Instrument used: prototype transportable PC-supported IMS, developed at the Central Institute of Isotope and Radiation Research, GDR Academy of Sciences, Leipzig

Instrument Calibration

In order to predict the position of nerve agents on the flow-time axis, the ion mass - ion mobility - dependence was established using several nerve agent simulants. The concentrations were in the range of 5 to 50 ppb using a gas permeation chamber. Dimerization peaks were usually recorded at concentrations of 5 to 35 ppb, and the peaks corresponding to ions of the type M_2H^+ (M = molecule of the substance to be determined) - the energetically most stable ions generated - were usually selected for identification purposes. Also, peaks corresponding to