

Instantaneous Detection of Explosives on Clothing

The detection of explosives is of vital importance in forensic applications and in preventing criminal or terrorist activity. The analytical detection of explosives on surfaces is normally done by using solvent extractions or wipes and chromatography or chromatography combined with mass spectrometry. This is inefficient because solvent extractions and wipes only result in a partial transfer of material from the surface into the sampling material. Furthermore, the chromatographic analysis can be time-consuming and requires the use of disposable solvents (an environmental concern).

The JEOL AccuTOF™ with Direct Analysis in Real Time (DART™) has demonstrated the capability to detect both volatile and involatile explosives on surfaces such

as plastic, cloth, concrete, glass, cardboard, metal, and more. No wipes or solvent extractions are required. The method is instantaneous, environmentally friendly, and does not require solvents. An example is shown in this application note.

A construction company has been recently conducting blasting to remove boulders near our offices. One of our employees happened to walk through the edge of the plume from the blasting when he arrived for work in the morning. At the end of the day, more than eight hours later, we tested him for exposure to explosives. By placing the employee's necktie in front of the DART we could easily detect nitroglycerin, as shown in Figure 1 (below). It was not necessary to take the tie off to perform the analysis.

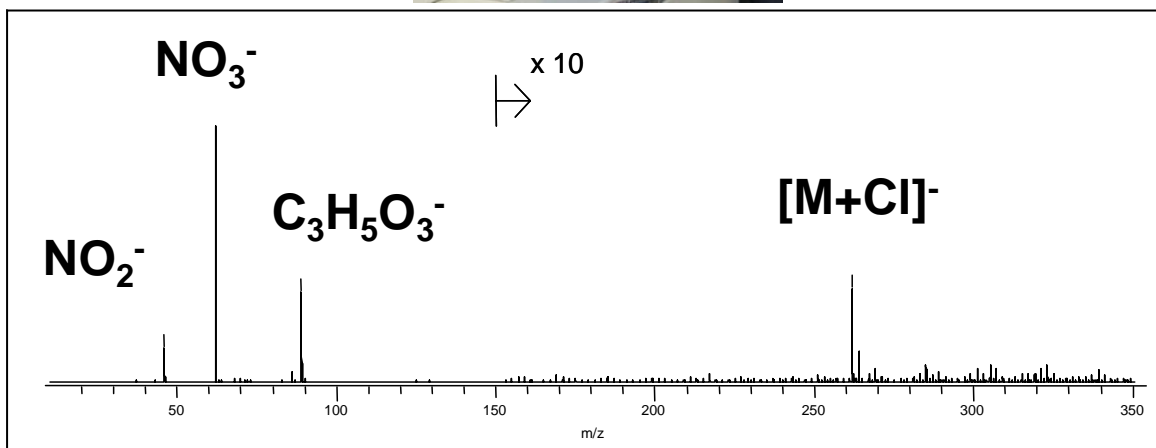


Figure 1. Nitroglycerin detected on an employee's tie after exposure to a plume from blasting. Methylene chloride vapor was placed beneath the DART to enhance the formation of $[\text{M}+\text{Cl}]^-$. All elemental compositions were easily confirmed by exact mass measurements.