

Portable Analyzers for Rapid Bottled Liquids Analysis

Portable dangerous liquid detector based on Raman spectra registration (Raman spectroscopy)

The increased threat of terrorist attacks, impossibility of distinguishing between explosive and highly flammable substances (RYEL) without container opening and prolonged analysis compel airport security services prohibit bringing on board any liquids. This creates significant discomfort for airline passengers taking flights without meals, passengers requiring specialized meals or those whose cabin luggage contains vital and essential medicines in liquid form. Proceeding from the ICAO requirements on security control for products allowed in cabin luggage, *EnSpectr* has designed a simple and reliable dangerous liquid detector.



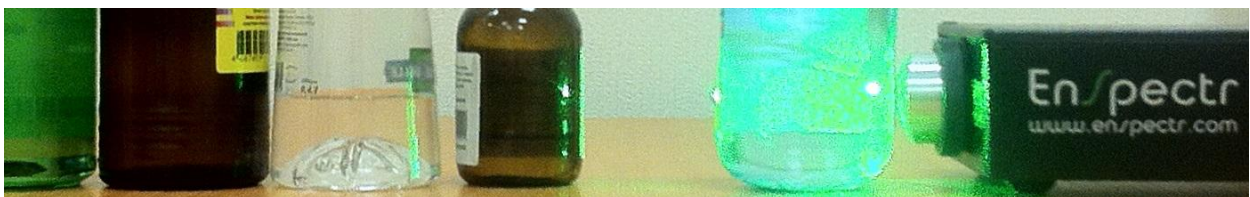
Potential methods of detecting dangerous liquids in the conditions of mass airline passenger inspection before boarding must meet specific requirements:

- reliable differentiation of water or aqueous organic solutions (perfumes, medical products, foodstuffs, etc.) from dangerous liquids (or their precursors);
- simplicity of analysis including portability of the device, no need for container opening, operation convenience during inspection;
- quick analysis in the conditions of limited time inspection;
- prevention of potential inflammation or explosion of dangerous liquid during analysis as a result of unavoidable action on substance tested.

These requirements are met by the portable *EnSpectr RaPort* liquid analyzer designed in Russia within the framework of the science-consuming technology program.

Reliable identification of substance to be analyzed is based on

- ✓ the unique properties of so-called Raman scattering spectra (Fig.1);
- ✓ the reliable design excluding potential shifts of individual substance bands compared to the reference spectra from the database supplied with the device;
- ✓ the software that enables quick and reliable comparison of the measured spectrum of the unknown substance and the reference spectra from the database.



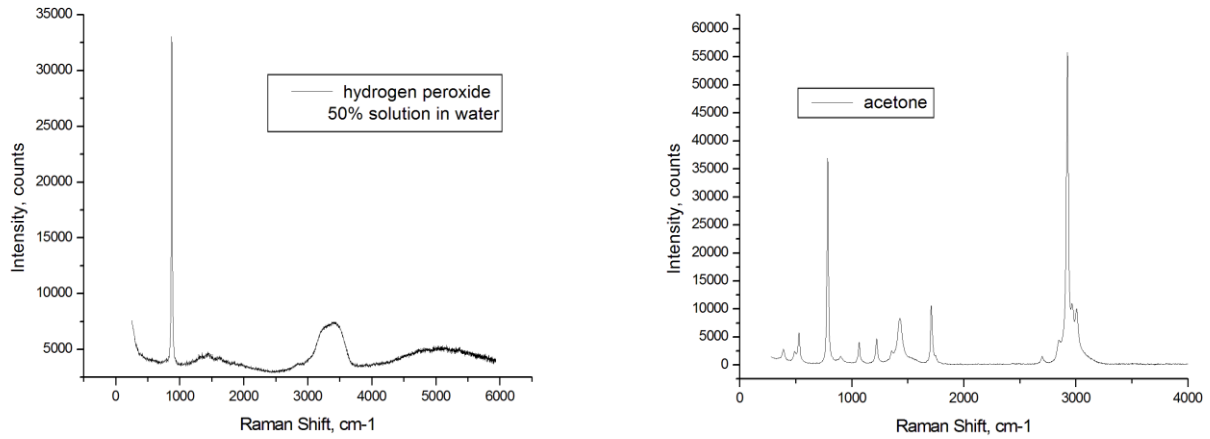
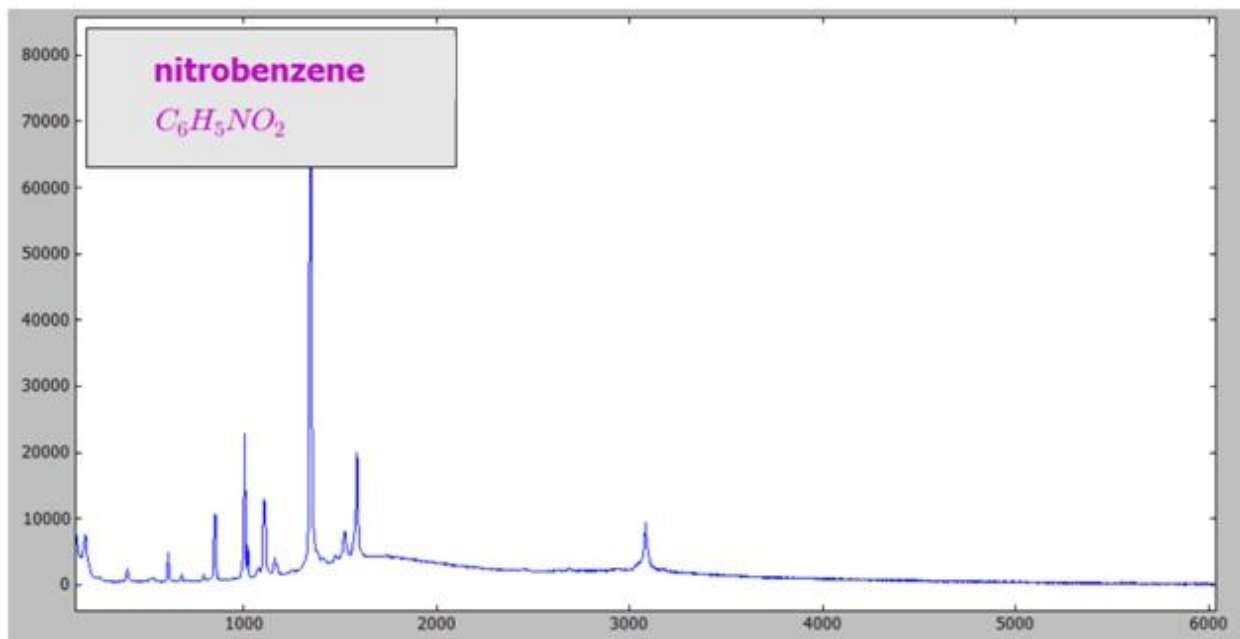


Fig.1

Simplicity of liquid detection is ensured by:

- the use of specially focused laser emission for excitation of registered spectra, which enables liquid analysis through any transparent and semitransparent glass or plastic container, i.e. without container opening;



- the specially developed user program interface. The program compares the spectrum obtained with the spectra of forbidden and allowed substances and generates the “Forbidden – Allowed – Requires additional identification” signal on the screen Fig.2.;

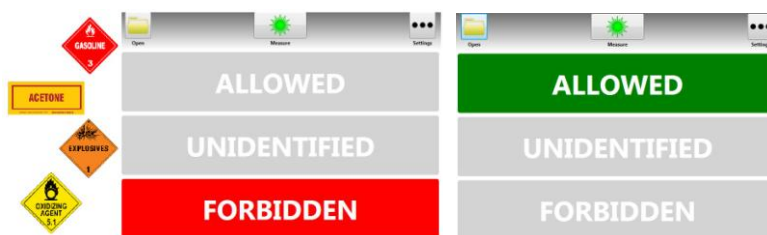


Fig. 2

- short time of registration of spectrum and its identification by the database (within 5s from measurement start);
- the small dimensions of the device.

Safety of inspecting personnel is ensured by:

- minimum heating of liquid in the course of analysis due to the low kW rate of the laser and short exposure time (several seconds) preventing detonation or inflammation of analyzed potentially dangerous substance;
- absence of necessity for opening the container with potentially dangerous liquid.

Extra performance capabilities. The database includes spectra of most liquid toxic and explosive substances and their precursors. When required, the database can be supplemented with other forbidden substances (for instance, narcotic drug database). The software allows qualified personnel to perform detailed manual mode analysis of detected forbidden substance for making a decision as to further actions of the airport security service.



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