

A high-resolution mass spectrometer for real-time VOCs monitoring

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Abstract

The confined atmosphere on board submarine contains a complex mixture of different pollutants such as volatile organic compounds (VOCs) present in low concentration. Nowadays VOCs are monitored by retrospective analysis that is performed by an adsorbent resin trap followed by GC/MS analysis. However, a real time analyzer located onboard submarine can be useful for crew safety during patrol and can also provide complementary data gathered from retrospective analysis.

High-resolution mass spectrometry for VOCs monitoring is a growing field. In particular a Fourier Transform Ion Cyclotron Resonance (FT-ICR) mass spectrometer is known to be sensitive and efficient. A chemical ionization method associated to the FT-ICR mass spectrometer seems to be particularly suited for VOCs detection and quantification.

The FT-ICR mass spectrometer has significant advantages: (i) fast analysis, (ii) compounds can be quantified from ppm to ppb, (iii) broad band detection; the whole mass range (10-500) can be monitored simultaneously and (iv) no calibration is needed because of absolute measurement.

This paper describes the FT-ICR mass spectrometer technology and presents validation trials required before performing validation trials on board submarine.