Oil-in-Water Monitoring in the North Sea using Membrane Inlet Mass Spectrometry

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A membrane inlet mass spectrometry (MIMS) system has been used for detection and analysis of two types of North Sea crude oil. The system was installed on-field on the Flotta Oil Terminal (Orkney, UK). It consisted of a quadrupole mass spectrometer (QMS) connected to the capillary probe with a silicone-based membrane. The produced mass spectra and calibration plots from the MIMS instrument showed capability to measure levels of individual hydrocarbons within crude oil in sea water. The generated mass spectra from the field tests also showed ability to distinguish between different types of oil and determining concentrations of toxic hydrocarbons in oil (e.g. benzene, toluene and xylene (BTX)). The performance of the instrument at different temperatures of sea water and oil droplet sizes was also investigated. The results showed that QMS-based MIMS system has a potential to complement existing oil-in-water (OiW) monitors by being able to detect different oil types and specific hydrocarbon concentrations with high accuracy, which are currently not supported in commercially available OiW monitors.