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Mercury speciation in liquid petroleum products: Comparison between on-site approach and lab measurement using size exclusion chromatography with high resolution inductively coupled plasma mass spectrometric detection (SEC-ICP-HR MS)

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Abstract

The accuracy of two different analytical methods dedicated to the speciation of mercury in liquid hydrocarbons is discussed in the present paper.

A first step involving the comparison of a modified UOP 938 method based on filtration, purge and extraction with size exclusion chromatography coupled to ICP-HR MS (SEC-ICP-HR MS) was carried out on specific synthetic model mercury compounds.

The modified UOP 938 method (defined here as operational speciation) allowed various mercury compounds to be grouped into different families, i.e. particulate, volatile, ionic and organic non-ionic mercury, whereas SEC-ICP-HR MS provided size distribution profiles of mercury-containing molecules.

In a second step, comparison of the two different approaches was then performed with real hydrocarbon feeds, such as crude oil, condensate and straight-run gasoline samples. It was demonstrated that even though elemental Hg was present for the North Sea condensate, all of them contained ionic Hg associated to molecules containing few to many tens of carbon atoms.