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Mass Spectrometry: A pioneer and renewed tool for petrochemical analysis

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Mass spectrometry has become an essential tool in science as a whole due to extraordinary advances and the great diversity and broadness of currently available ionization techniques and its extraordinary speed, sensitivity and selectivity. In the field of comprehensive crude oil analysis -petroleomics- techniques used to investigate the composition of nonpolar or less polar components of crude oils, their most abundant components, have long been used, are currently very well established and of high efficiency. These techniques include gas chromatography with flame ionization detection (GC-FID) and GC coupled to mass spectrometry (GC-MS). For the investigation of polar components of crude oils, direct analysis with no previous separation via ultra-high-resolution and ultra-high-accuracy Fourier transform ion cyclotron resonance mass spectrometry (FT-ICR MS) and electrospray ionization (ESI) in both the negative and positive ion modes have been recently incorporated as the technique of choice. ESI FT-ICR MS data have been collected for crude oil, jet fuels, gasolines, and biodiesels, and the resulting mass spectra have been found to contain a remarkable amount of information on the composition and properties of these very complex mixtures. Recently, sample preparation in MS analysis has been eliminated with the introduction of a variety of new desorption/ionization techniques performed at ambient conditions directly from samples (including crude oil and derivatives) placed on surfaces or in their natural matrices. In this talk, we will highlight the long lasting and increasingly important role of mass spectrometry techniques for crude oil and fuel analysis.

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