
POLYMERS AND PETROCHEMICALS CHARACTERISATION USING ION MOBILITY/TOF AND NOVEL SOURCES

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The analysis of petrochemicals and high polymers is a demanding application where a wide variety of powerful analytical techniques is usually required. High Resolution Mass Spectrometry (HR-MS) has widely been adopted in this arena as a powerful research tool due to the specific information that it offers.

The analysis of samples like crude petroleum oil and high molecular weight polymers is a challenging matter as samples can be very complex and exhibit a high dynamic range. This can make the observation and analysis of minor species difficult. Any separation technique that allows a reduction in the sample complexity is beneficial for the complete characterisation of polymers. Demands for increased throughput and elucidation of increasingly complex samples means chemists are constantly striving for techniques that add dimensions of orthogonality to separations. Ion mobility spectrometry (IM) separates gas-phase ions based on their cross-section and can be coupled with a quadrupole-time-of-flight (Q-TOF) mass spectrometer to yield a powerful tool used in the identification and characterisation of complex samples. Assuming the cross-section is different, spatial polymeric isomers will be separated and its structure studied by using isomeric specific fragmentation data.

ESI and MALDI are currently the most common ionisation techniques in MS. A wider range of ionisation techniques will be of benefit as it widens the possibilities for analysis. Two novel sources will be presented and their benefits demonstrated. A novel atmospheric pressure ion source (APGC) for tandem quadrupole and quadrupole time-of-flight LC/MS/MS instruments will be described in this work, this allows laboratories to switch rapidly between LC and GC applications to analyse volatile and semi-volatile compounds of low and intermediate polarity traditionally analysed by dedicated vacuum GC/MS instruments. An atmospheric pressure probe that allows the direct analysis of solids will also be presented.