

Hydrogenation Reactions during Pyrolysis-Gas Chromatography/Mass Spectrometry Analysis of Polymer Samples Using Hydrogen Carrier Gas

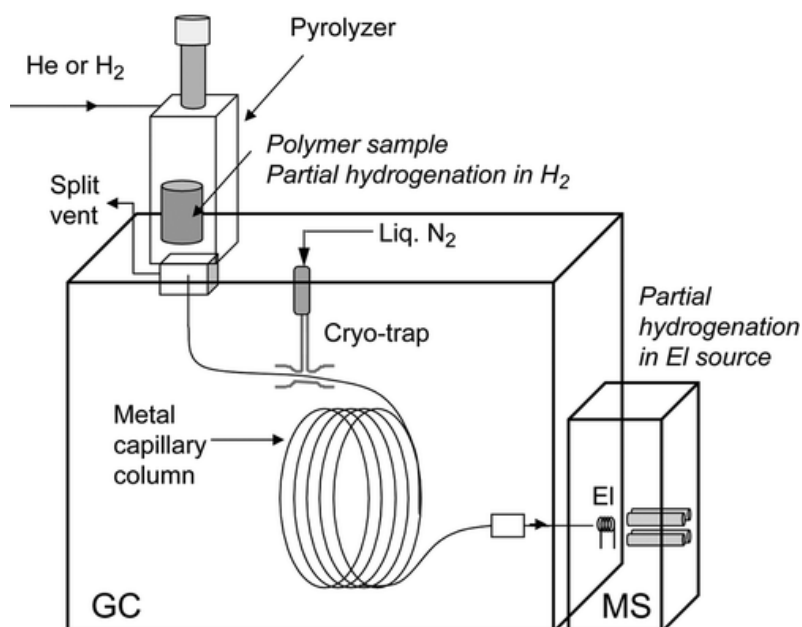
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Abstract:

Pyrolysis-gas chromatography/mass spectrometry of polymer samples is studied focusing on the effect of hydrogen (H_2) carrier gas on chromatographic and spectral data. The pyrograms and the related mass spectra of high density polyethylene (HDPE), low density polyethylene, and polystyrene (PS) serve to illustrate the differences between the species formed in H_2 and the helium environment. Differences in the pyrograms and the spectra are generally thought to be a result of the hydrogenation reaction of the pyrolyzates. From the peak intensity changes in the pyrograms of HDPE and PS, hydrogenation of unsaturated pyrolyzates is concluded to occur when the pyrolysis is done in H_2 . Moreover, additional hydrogenation of the pyrolyzates occurs in the electron ionization source of a MS detector when H_2 is used as a carrier gas. Finally, the applicability of mass spectral libraries to characterize pyrograms obtained in H_2 is illustrated using 24 polymers. The effect of the hydrogenation reaction on the library search results is found to be negligible for most polymer samples with polar and nonpolar monomer units.

* Excerpted from online journal website (Click the title)



Frontier Labs products used:

Multi-functional Pyrolyzer, MicroJet Cryo-Trap, UA⁺-1, UA⁺-5, Vent-free GC/MS adapter, F-Search