

Analysis of Plasma polymerized Hydrocarbons by
Pyrolysis and Gaschromatography

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Plasma polymerized hydrocarbons were investigated by flash pyrolysis followed by hydrogenation of the fragments and gaschromatography, all under reproducible conditions. With the different monomers, studied: ethane, ethylene, acetylene, butadiene and benzene, none of the programs resembled those from commercial polyethylene, polybutadiene or polystyrene. Each of the programs did exhibit essentially the same fragments up to C₈, but in a different distribution. This indicates that the samples are structurally very similar with a random arrangement of side chains, crosslinks and double bonds. Changes in the fragment distribution were obvious when the sample is a powder, a film deposited on the pyrolyzer probe, or on oily film. It was shown that powders generally have the highest concentration of long branches and/or crosslinks. Both the oils and the high molecular weight films have predominately short branching, however, the oil fraction from ethylene and butadiene contain, in addition, aromatic structures.

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