Pyrolysis GC/MS of Tobacco in air and helium

[Background] It is often instructive to compare the pyrogram of a material pyrolyzed in an inert atmosphere (e.g. He) with one obtained in an oxidative atmosphere (e.g. air). The comparison often yields information on the degradation process. Differences in the two pyrograms can be attributed to the oxidation of some sample constituents during the pyrolysis at elevated temperatures. Exposure to pyrolyzates found in the emissions of a material as it is "burned" may have health effects and be of general interest. Such is the case for tobacco. Temperatures reached during the burning of tobacco often exceed 700ºC. Here, the pyrolysis of tobacco was performed and pyrolyzates were examined.

[Experimental] Pyrograms were obtained in air and He at 600 and 800ºC using PY-GC/MS. See below for analysis conditions. The peak identifications are based upon MS data.

[Results] There are significant differences between the left (He) and right (air) pyrograms below. Nicotine found in He at 600ºC is thermally decomposed to nicotinonitrile, and the peak for acetic acid is greatly reduced at 800ºC. In an oxidative atmosphere, nicotine is degraded to 3-vinylpyridine and the formation of benzene is evident at 800ºC.

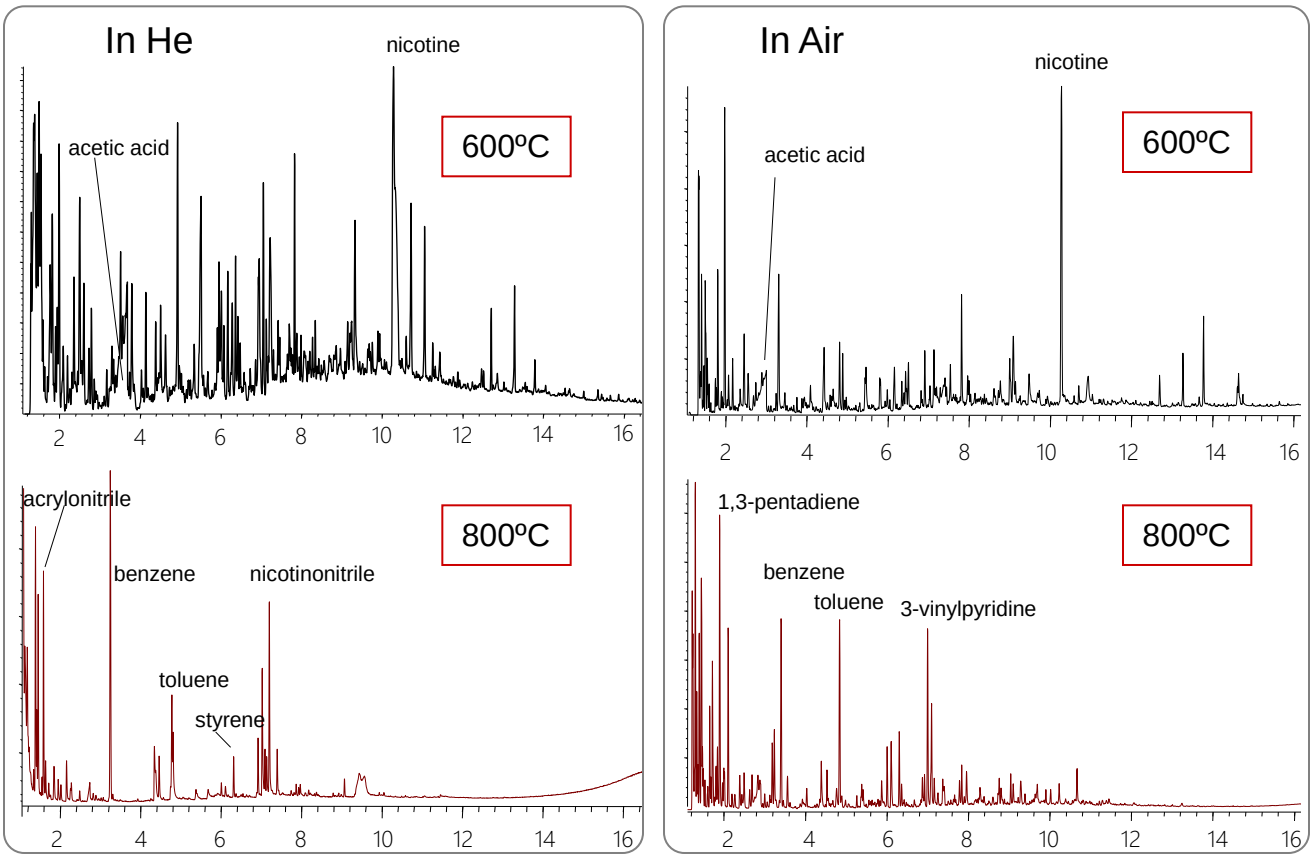

Figure 1 Pyrograms of tobacco obtained at 600ºC and 800ºC in air and in helium

Pyrolyzer temperature: 600/800ºC, GC injection port: 320ºC, GC oven : 40(2 min hold)-320ºC (20ºC/min), Separation column : Ultra ALLOY-1 30m x 0.25mm i.d., 0.5µm film, Column flow :1.0 mL/min, Split ratio: 1/50, Sample wt.: ca 0.5 mg, Other devices : Carrier Gas Selector, Selective Sampler, MicroJet Cryo-Trap

Keywords : Tobacco, Oxidative pyrolysis, 600ºC, 800ºC

Products used : Multi-functional pyrolyzer, Auto-Shot Sampler, Vent-free GC/MS adapter, Carrier Gas Selector, Selective Sampler, MicroJet Cryo-Trap, UA-1

Applications : Combustion gas, Atmosphere analysis, Smoke hazard

Related technical notes :

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