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FORMATION OF POLYCYCLIC AROMATIC HYDROCARBONS FROM THE GAS PHASE PYROLYSIS OF STEROLS: THE ROLE OF RESIDENCE TIME.

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There have been numerous studies on the formation of polycyclic aromatic hydrocarbons (PAHs) from the pyrolysis of tobacco components, especially those found in the hexane or petroleum ether extract of tobacco. Early studies focused on the effect of temperature on PAH yields, while later studies adjusted the pyrolysis conditions to produce PAH profiles similar to that found in cigarette smoke condensate. Unfortunately, all these pyrolysis studies have long residence times (typically minutes) which are not relevant to the unique conditions found in a burning cigarette in which volatile species have residence times of <1s in the hot zone. This fact questions whether the specific tobacco constituents, such as sterols and terpenes, that have been correlated with PAH formation based on long residence times pyrolysis experiments are the same constituents that form PAHs in a burning cigarette. In this presentation, the impact of residence times on the yield of PAHs formed from the gas phase pyrolysis of sterols, such as stigmasterol, will be presented. The flow pyrolysis of sterols (in helium or 5 % O_2 in helium) will be investigated with residence times of 100 – 2000 ms and temperatures of 500 – 800 °C. The goal of this fundamental research is to determine the role of gas phase reactions in PAH formation, and to gain insight into the kinetics and mechanisms of PAH formation for constituents found in tobacco.