Four-Step Analysis of Smokeless Tobacco

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Application Note
Tobacco

Tobacco has been studied extensively using analytical pyrolysis, frequently from the standpoint of identifying specific compounds in the smoke. Whether or not the tobacco product is intended to be smoked, however, significant information may be obtained using a series of thermal sampling steps. The tobacco shown here is a flavored, smokeless product, flavored with wintergreen.

At 100°C, two of the principal components may already be seen, as shown in Figure 1. Nicotine, naturally present, and methyl salicylate, wintergreen flavoring, an additive, are readily apparent. In addition, vitamin E, a natural product of tobacco, is also seen.

At 200°C, acetic acid and propylene glycol are detected. At this temperature, the tobacco begins to degrade, and pyrolysis products may be seen. At 300°, degradation products of cellulose become significant, including furans and levoglucosan.

There are several advantages in performing multiple thermal steps in this analysis. Some of the minor constituents (like the vitamin E) would be difficult to identify if a single pyrolysis run, producing all the products at once, were done instead. This approach also makes it clear that the nicotine is actually quite volatile and, even when tobacco is smoked, is not a pyrolysis product, but simply volatilized. Additives, such as menthol, methyl salicylate, propylene glycol and glycerine, may also be determined easily, apart from the products generated when Tobacco is pyrolyzed.
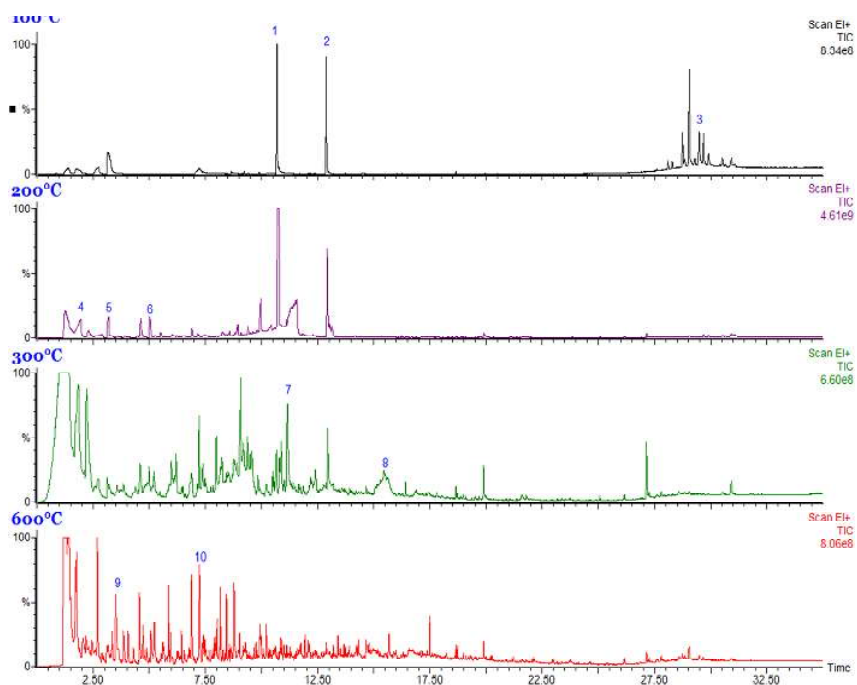

Figure 1. Analysis of wintergreen flavored smokeless tobacco at 100, 200, 300 and 600°C.

Instrument Conditions
Pyroprobe

Pyrolysis: 100, 200, 300, and 600°C 15 sec

Valve Oven: 300°C
Transfer Line: 325°C

GC/MS

Column: 5% phenyl (30m x 0.25mm)
Carrier: Helium, 50:1 split
Injector: 300°C
Oven: 40°C for 2 minutes
                 10°C/min to 300°C
Mass Range: 35-550

Table I Peak Identification

1. Methyl salicylate
2. Nicotine
3. Vitamin E
4. Acetic acid
5. Propylene glycol
6. 2-Furanmethanol
7. Hydroxymethyl furancarboxaldehyde
8. Levoglucosan
9. Toluene
10. Phenol

FOR MORE INFORMATION
CONCERNING THIS APPLICATION, WE RECOMMEND THE
FOLLOWING READING:

E. B. Sanders, et al., A model that distinguishes the pyrolysis of Dglucose, D-fructose, and sucrosefrom that of cellulose.
Application to the understanding of cigarette smoke formation,
J. Anal. Appl. Pyrolysis, 66
(2002) 29-50.