CHARGE NUMBER: 0108

PROGRAM TITLE: Mechanisms for Smoke Formation

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As mentioned earlier, results indicate that exchange between $H_2{}^{18}O$ and gas phase constituents after smoking is extensive. One must also consider the possibility of exchange between the water of equilibration and smoke component precursors. Preliminary results by I.R. indicate this exchange may be occurring between KNO_3 and $H_2{}^{18}O$.

An experiment was run to examine the interaction between air and $H_2{}^{18}O$. The principal interest was to see if H_2O and O_2 would undergo any oxygen atom exchange. To simulate mainstream conditions, 35 cc of air was pushed through a gas phase trap that contained 1 µl of $H_2{}^{18}O$. The sample (O_2, CO_2, H_2O) was analyzed for atom % O-18 employing GC/MS. The results are shown below.[1]

Compound	atom % ^{18}O
H_2O	58
O_2	0.3
CO_2	1.2

The natural ^{18}O abundance is 0.2%.

Pyrolysis/GC/MS was run at 700°C on glucose plus phthalic anhydride and phthalic anhydride alone. The pyrolyzate was separated employing a 20' x 1/8", 3.5% Carbowax 20 M column. Data reduction is underway.[1,2]

The mainstream gas phase smoke from a cigarette containing the Sword compound labelled with ^{14}C in the t-butyl position was analyzed by GC/MS.

Linear equations from the variation of ϕext with α for short ranges in the area of an alpha of 1 and also between 1 and 2 have been determined. Various values of m(1.3 - 1.6) were used with the Mie calculation of κ where

$$\kappa = \frac{\pi d^2}{4} \times N \times \phi ext$$

Employing an incandescent source with a silicon phototransistor plus interference, 400 nm seems to be the lowest wavelength that can be used. The use of other light sources and detectors are being considered. Both the long and short wavelength mercury line should be useful and such lamps have been placed on order.[3]

[1] R. Kornfeld Notebook #7187
[2] J. Kang Notebook #7262
[3] R. Creamer Notebook #7237

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