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 ORGANIZATION : ITL CANADA
 GROUP NUMBER : 578
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 PROJECT TITLE : Cigarettes Designed for Low Mutagenic Activity
 PERSON RESPONSIBLE : PORTER, A.; BILIMORIA, M.
 EFFORT : 1.32 * 1987
 PROJECT DESCRIPTION : Various options for the design of low mutagenicity cigarettes will be considered and prototype products made. As well as testing for Ames activity, consideration will be given to the smoking qualities of the product and the smoke deliveries.

 SCOPE : GROUP
 DEPTH : FUNDAMENTAL
 FUNCTION : GENERAL
 OBJECTIVE : REGULATORY
 CLUSTER : BIOLOGY

 DATE REVIEW WRITTEN : June 1988
 REVIEW TITLE : Cigarettes Designed for Low Mutagenic Activity.
 REVIEW TEXT : The effect of filter pressure drop on the mutagenic activity of condensate has been investigated. Five cigarette samples were made up as follows : Player's Check 28 (plain), Check 28 + Low (29 mm) P.D. filter, Check 28 + High (110 mm) P.D. filter, Player's Filter KS (55 mm P.D. filter) and Player's Filter tobacco rod. For each sample, the same length of tobacco rod was smoked and the condensate collected by capillary press (Ames Activity) or by Cambridge filter (smoke deliveries). The specific mutagenic activities of the whole condensate were : 1.35 (+0.21), 1.51 (+0.22), 1.56 (+0.25), 1.89 (+0.36), 1.66 (+0.33) rev/ug, respectively.

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Although the specific mutagenicities are not significantly different, the data suggest that a cellulose acetate filter increases the specific mutagenic activity of the smoke. When the mutagenic activities are expressed on a dry tar weight basis, the differences in specific activity are almost eliminated. This suggests that selective filtration of water and possibly other inactive smoke components is responsible for the increase in the specific activity of condensate from cigarettes with C/A filters. (It should be noted that on a per cigarette basis mutagenic activity is greatly reduced by the use of filters due to the large reduction in tar).

As a corollary to this study we examined the effect of an impaction (Van Eck) filter on mutagenic activity. This filter was marketed in the 1970's in Canada as a tar reducing cigarette holder. We expected that this filter would not remove the more volatile, inactive smoke components to the same extent as a C/A filter. The Van Eck filter was attached to a du Maurier tobacco column and its effect on tar delivery and mutagenic activity was compared to the effect of the normal C/A du Maurier filter. The Van Eck filter had a tar F.E. of 45% compared with 35% for the du Maurier filter. However, compared with condensate from the unfiltered du Maurier tobacco rod, the Van Eck filter increased specific activity by 10% compared with a 19% increase for the C/A filter. The differences in mutagenic activity resulting from the two types of filter may be an explanation for the higher activities observed for condensate trapped by capillary press than by Cambridge filter.

We have evaluated the use of the John Payne Tar Predictor as a means of generating condensate for mutagenicity testing. This has the advantages of rapid generation of condensate, minimal sample preparation, constant combustion conditions and flexibility as to the form of tobacco or material that can be investigated.

1 g samples of cut tobacco were combusted using conditions previously used for tar prediction (ITL report # 169). Initial testing involved comparison of Canadian flue-cured (Player's Check), English Virginia blend (Senior Service), Oriental (Oriental) and air cured (Gauloise) tobaccos. Specific activities (rev/ug) of condensate from the Predictor were, respectively : 0.325 (+0.05), 0.673 (+0.14), and 1.11 (+0.14) and 2.21 (+0.37) rev/ug. Specific activities from the corresponding cigarettes were : 0.767 (+0.03), 1.16 (+0.20), 1.30 (+0.10) and 3.45 (+0.54) rev/ug. Thus the Tar Predictor produces condensate with lower activity than that from cigarettes. However, the activity ranking is the same in either case.

We have also examined the effects of packing density and various additives on condensate activity from the Tar Predictor. Results from these studies will be reported elsewhere.