

DETERMINATION OF POLYNUCLEAR AROMATICS IN THE SMOKE

Another test that will be of help in determining the effect of solvent extraction of tobacco on the cigarette smoke is the comparison of the polynuclear aromatic content of the smoke from the extracted and the control cigarettes. This experiment will be undertaken as soon as the smoking machines are available for smoking cigarettes, other than for Dr. Gilman and for filtration efficiencies.

J. E. de Souza

JEdS:DT

ill

100171659

Cigarettes No. 5X (extracted) have a little less shorts and a little longer cut tobacco but the differences between cigarettes No. 5 and 5X are minor and could be due to sampling differences. The above results indicate that the extraction of cigarette tobacco does not appreciably alter the number of shorts nor the per cent snalls.

DETERMINATION OF WHOLE TAR WEIGHT IN SMOKE

Four lots of fifteen (15) cigarettes each of both 5 and 5X cigarettes were selected, smoked, and the whole tar determined by the procedure described in our Memorandum of October 10, 1957.

TABLE I

	<u>5</u>	<u>5X</u>
Weight of whole tar in mg./cigt.	29.5	20.9
	28.4	20.0
	25.8	19.3
	25.4	17.3
Ave.	<u>27.8</u>	<u>19.9</u>

There was a 23.4% decrease in whole tar weight from cigarettes, the tobacco of which had been extracted. It is noteworthy to remember that n-hexane only extracted 4% of the tobacco constituents. It is obvious that this solvent removes precursors of cigarette smoke constituents which account for nearly one quarter of the whole tar weight.

PHYSIOLOGICAL TESTS

In order to further evaluate the significance of a n-hexane extraction of tobacco, it was decided to carry our physiological tests on the cigarette smoke from the extracted cigarettes, #5X, identical to those already undertaken by Dr. Gilman with base-free tars from flue-cured tobacco cigarettes, that is, to test their activity as a promoter and a cocarcinogen, using the tar from the No. 5 cigarettes as control. In order to bring the test more in line with those carried out by Dr. Wynder et al, of the Sloan Kettering Institute, whole tar will be used instead of base-free tar, provided the tolerance of the mice to alkaloid toxicity can be gradually built up. Another reason for using whole tar is that, if these results are published, they cannot be criticized on the basis that a fraction of the whole tar was taken out. The weights of whole tar per painting have been adjusted proportionately in order to be equivalent to the weights of base-free tar previously used. In addition, to eliminate any bias on the part of Dr. Gilman who will carry out these tests, all shipments to him will be identified only by the Nos. 278 and 199 corresponding to tars from cigarettes No. 5 and 5X respectively.

The results of the physiological tests should be finalized in approximately a year and a half.

..... 4
100171660

The 225 lbs. thus extracted possessed a pronounced and undesirable odour and was discarded. The odour was traced to impurities in the solvent due mainly to contamination by the Anachemia still.

A further 60 lbs. of cut tobacco from the control at I.T. Co. was extracted using purified n-hexane (by mixing with silica gel (50 gal./2 lbs) for 24 hours and distilling at 69° - 70°C.) and a still that was completely scrubbed out.

After 16 hours of extraction, a 4% yield (1.1 kg.) was obtained. The extracted tobacco was spread out and air dried for a couple of hours, then repacked and shipped to I.T.Co. This time there was no foreign odour other than that of excess solvent. The tobacco was freed of solvent and brought back to normal moisture content by spreading out in a thin layer and blowing moist air over it during the weekend.

In appearance and feel the reconditioned extracted tobacco was very similar to that of the control (unextracted). There was some slight difference in odour.

For evaluation of smoking characteristics, cigarettes were made to 25.5 mm. circumference, 72 mm. length, 25 cigs./oz (typical dimensions of flue-cured cigarettes) and with wetproof paper from both control and extracted tobacco and identified by the numbers 5 and 5X respectively.

PSYCHOMETRIC EVALUATION

In a difference test, of forty (40) smokers tested, 7 selected wrongly and 33 correctly, indicating a significant difference between the two types of cigarettes.

On the other hand, a preference test, carried out with 102 smokers, showed 50 preferring the control and 52 the extracted cigarettes. A repeat of this test had 21 selecting sample #5 and 19, sample #5X. In neither, therefore, was there any significant preference between the two types of cigarettes.

SIEVING AND STABILITY TESTS

On Ripped Cigarettes Over Mesh	SIEVING TESTS		STABILITY TESTS	
	5X %	5 %	5X % SMALLS	5
6	32.05	29.25		
10	22.86	23.12	.77	.95
14	18.46	18.98	.87	.85
20	12.72	14.25		
28	7.86	8.49		
Through 28	6.05	5.91		

..... 3

100171661

C O P Y

Research Laboratory

Research & Development Dept.

February 7, 1958.

CONFIDENTIAL

LARGE SCALE EXTRACTION OF CANADIAN FLUE-CURED CUT TOBACCO

References: File Memorandum March 5, 1957.

File Memorandum October 10, 1957.

In view of the widespread publicity on the possible cause and effect relationship between smoking and health and of the implications that precursors of carcinogens in smoke should be removed by a pre-treatment of the tobacco used in cigarettes, this laboratory suggested that it would be advisable to undertake an experiment of solvent extraction of tobacco to determine, firstly, if it was feasible, and secondly, if the extracted tobacco would yield a good quality cigarette.

It is fully realized that the scaling up of this experiment to a factory operation would present difficulties. It was, however, thought advisable to acquire some knowledge of the possibilities of this process.

A Private Communication from Dr. Wright (File memo of March 5, 1957) informed us that the pyrolysis of a hot n-hexane extract of tobacco yielded products that showed a very great activity on mice when tested by the Sebaceous Gland Technique. The implication was that the hot hexane extracted precursors of carcinogenic products in smoke. On the other hand, the I. T. Co. laboratory had already extracted cigarettes with n-hexane and found that the cigarettes could be reconditioned quite readily. These latter were then subjected to a psychometric test and no significant preference was established between them and unextracted cigarettes.

The above factors were mainly responsible for the choice of n-hexane as the solvent for this experiment. The initial experiment called for 450 lbs. of a typical cut blend of flue cured tobaccos including 12% C.R.S. of which half was sent to Anachemia Chemicals for extraction, the remainder being kept at I. T. Co, as a control. All precautions were taken to insure that as little as possible of the tobacco was broken up and that it was received by Anachemia just prior to extraction. After extraction in 75 lbs. lots, the tobacco was spread out on tables and air dried before being returned to I. T. Co.

..... 2

100171662