UNIFORMITY IN CIGARETTES

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Considerable work has been done in the determination of the characteristics and chemical constitution of products formed during the burning processes in cigarettes. Bradford and coworkers have done considerable work (1) in the determination of volatile acids and bases present in cigarette smoke, while Forbes and Haag (2) have investigated the presence of hygroscopic agents in cigarette smoke.

In the course of smoking different brands of cigarettes, it has been observed that some blends apparently burned more rapidly than others and that differences in weight (tightness of the wrapping) were also evident. As a result of these observations it was decided to undertake a study of some of our popular brands of cigarettes by means of a mechanical smoking machine and arrive at definite figures to support the above observations.

Two concentric snug fitting brass tubes were mounted in such fashion that the inner tube acted as a piston while the outer tube was fitted with a taper of suitable size to admit the end of a cigarette. A reduction gear and electric motor were mounted and connected to the brass tube "piston" in such a manner that the piston would make seventeen strokes per minute. The volume of air drawn into the cylinder on the "suction" stroke approximated 35 ml. On the "compression" stroke, the gases within the cylinder were discharged through a side valve consisting of a smooth aluminum disk resting on a square polished brass surface.

Each package of cigarettes used was opened and each of three adjacent cigarettes tested as follows: (1) The cigarette was removed from the pack and accurately weighed, (2) inserted in the smoking machine and "smoked" for two minutes (thirty-four strokes), (3) rapidly removed and extinguished in a CO_2 atmosphere, (4) the unburned portion and all ashes were again weighed, and (5) the approximate length of the unburned portion was measured to the nearest millimeter.

No attempt was made to cover the entire "field" of available cigarettes and the total number of samples run on any one brand was a result of the convenience and consideration of friends who were willing to "enter their brand in the study." The entire investigation was completed in approximately six weeks. The data as presented in this report should not be interpreted as having definite bearing on the present status of any brand of cigarette at the present date. Tables I, II, and III show a general summary of the data obtained in this study.

TABLE I

Brand	Number of Packages Opened	Number of Samples	Av. Wt. of a Cigarette Before Smoking in Grams
1	11	33	1.09
2+*	17	51	1.09
3+	11	33	1.12
4	8	24	1.10
5	10	30	1.10
6	10	30	1.10
7	5	15	1.10

+ Cork tipped. Average weight of cork tip—0.014 grams.
** Mentholated.

TABLE II

Brand	After Smoking		Av. Loss in Wt.	Av. % Burned
	Av. Wt.	Av. Length		
1	0.6518 g.	30.7 mm.	0.44 g.	40.7
2	.6204	26.7	.47	43.2
3	.6689	29.8	.45	40.5
4	.6796	32.7	.42	38.6
5	.8451	45.9	.36	32.7
6	.7416	37.7	.36	33.1
7	.6711	32.7	.43	39.5

TABLE III

Brand	In Any Single Package			Av. Deviation from Av. Wt.
	Maximum Wt. in Grams	Minimum Wt. in Grams	Maximum Diff. in Grams	
1	1.17	1.00	0.17	0.04
2	1.21	1.00	.21	.06
3	1.35	1.12	.23	.07
4	1.14	1.04	.10	.03
5	1.29	1.06	.23	.05
6	1.19	1.05	.14	.05
7	1.19	1.07	.12	.04

In conclusion, we may say that for the most part there is a rather definite uniformity in the weight in individual packages. One often encounters two adjacent cigarettes which will vary as much as 23 per cent in weight. The heavy cigarette burns more slowly than a correspondingly lighter cigarette.

REFERENCES

(1) Ind. Eng. Chem. *29*, 45, (1937).
(2) Ind. Eng. Chem. *30*, 117, (1938).