

THE INFLUENCE OF THE FILTER ROD LENGTH UPON THE COMPOSITION OF CIGARETTE SMOKE

Natasha Zdraveska

*University "St. Kliment Ohridski" - Bitola, Scientific Tobacco Institute - Prilep,
Republic of Macedonia, e-mail: : Natasha_z78@yahoo.com*

ABSTRACT

The growing anti-smoking campaign along with the restrictive standards and demands represent a challenge to the tobacco industry in terms of reducing the observed dangerous substances in smoke while preserving the taste of cigarettes. On the other hand, World Health Organization has appealed to the scientific community to focus on discovering the influence of design elements upon the content of smoke emission. The aim of the research was to determine the influence of the filter length span on the content of dangerous substances observed in cigarette smoke. By using standardized methods, we determined the influence of filter length upon the main substances in smoke – nicotine, tar, and carbon monoxide.

Key words: cigarette filters, smoking

ВЛИЈАНИЕ НА ДОЛЖИНАТА НА ФИЛТЕРНИТЕ ОТСЕЧОЦИ ВРЗ СОСТАВОТ НА ЧАДОТ ОД ЦИГАРИТЕ

Засилената антипушачка кампања и рестриктивните норми и барања и' наложуваат на индустријата за цигари да ги намали штетните материи во чадот, без притоа да се нарушат пушачките својства на цигарите. Од друга страна, Светската здравствена организација апелира до научната заедница да го насочи своето внимание врз разјаснување на влијанието на елементите на дизајнот врз емисијата на чад и нејзината содржина. Целта на истражувањата е да се констатира влијанието на должината на филтер-отсечокот врз содржината на штетните материи во чадот од цигарите. Со користење на стандардни методи го констатиравме влијанието на должината на филтер-отсечокот врз основните штетни материи во чадот од цигарите - никотинот, катраните и јаглеродниот моноксид.

Клучни зборови: филтри за цигари, пушење

INTRODUCTION

The World cigarette market is in a state of constant change. This change is caused by the increased restrictive measures against smoking which are taken worldwide. The growing public interest in the state of the natural environment is the most recent factor (6). All these influences

have a considerable impact on tobacco industry.

Although they are different in different parts of the World, these forces have raised some general questions regarding the products in which the filter plays a significant role (2, 3). The tobacco industry is faced with the requirements to

reach low values for the observed and controlled dangerous substances in smoke, while still meeting the demands of the consumers (1, 8, 9).

All this increased the interest on the issues concerning filters, which found its place in a separate science.

For a short period of time, despite filter's aesthetic role, they have also become major modifiers of tobacco smoke (4, 5). Therefore, today, their diversity is extremely high. The first filters "Crap" have long given way to acetate filters and those combined. Bio-filters

have been in use for 10 years. However, all questions regarding the influence of cigarette design elements upon the smoke composition have remained to be corporate secrets. Thus, the World Health Organization has appealed to the scientific community to focus their attention on discovering it.

The aim of our research was to determine the influence of filter segment length on the content of dangerous substances observed in cigarette smoke.

MATERIAL AND METHODS

Widespread mono-acetate filters were used to realize the purpose of this investigation. Also, an average value blend for the cigarettes was developed from American blend, from

which laboratory cigarettes of different lengths of filter segments were made (king size, without ventilation). The studies were based on standardized methods for analysis.

RESULTS AND DISCUSSION

The results on the main physical characteristics of materials applied for cigarette making are listed in Table 1.

Table 1. Main characteristics of applied materials

Characteristics	Statistical evaluations				
	xcp	s	v	min	max
<i>Filter rods</i>					
Draw resistance, mmWG	394,26	7,491	1,90	381,00	411,00
Diameter, mm	7,801	0,012	0,15	7,79	7,83
Hardness, %	81,216	0,468	0,57	80,53	81,72
<i>Cigarette paper</i>					
Thickness, mm	0,038	0,001	1,86	0,037	0,039
Ash content, %	17,90	0,351	1,96	17,51	18,30
Air permeability, CU	50,63	4,106	8,11	43,00	62,00
Burning, s	55,85	0,738	1,32	54,80	57,20
<i>Wrap paper</i>					
Thickness, mm	0,043	0,001	1,89	0,042	0,044
Air permeability, CU	NO				

The selected materials are traditionally used by the industry. Our investigation included filter cigarettes with different lengths, such as: sample № 1 –15 mm, sample № 2 - 21mm length, sample № 3 - 25mm length and sample

№ 4 - 27mm.

The results of the research of filter segments used in preparation of laboratory variants are listed in Table 2

Table 2 Filter segments used in preparation of laboratory variants of cigarettes

Characteristics	Statistical evaluations				
	xm	s	v	min	max
1	2	3	4	5	6
Sample 1					
Filter length, mm	15,00	0,001	0,11	14,99	15,00
Diameter, mm	7,73	0,011	0,15	7,73	7,75
Draw resistance, mmWG	68,60	2,632	1,27	67,00	70,00
Sample 2					
Filter length, mm	21,00	0,109	0,20	20,98	21,02
Diameter, mm	7,75	0,001	0,12	7,74	7,76
Draw resistance, mmWG	71,17	2,220	1,64	70,00	73,00
Sample 3					
Filter length, mm	25,00	0,106	0,24	24,90	25,03
Diameter, mm	7,74	0,020	0,18	7,73	7,75
Draw resistance, mmWG	88,00	2,701	1,45	87,00	90,00
Sample 4					
Filter length, mm	27,00	0,186	0,94	26,98	27,01
Diameter, mm	7,75	0,010	0,21	7,74	7,79
Draw resistance, mmWG	91,20	2,109	1,83	91,00	93,00

The variation among the indicators is due to the variations found in filter rods. According to the results, it is apparent that with the increase of filter section length, there is a proportional increase of draw resistance. The laboratory cigarettes weighed 0,820 g.

In order to determine the influence of the filter section length upon the smoking properties, we conducted a tasting evaluation of the laboratory options.

The main results of the tasting evaluation are as follows:

Sample № 1 – It is characterized with a pleasant and intense flavor at a medium + level, clean and dense at medium level. The taste is rough, moderate irritation, burning at an average degree, taxation below average level, medium fullness. The physiological force is at above average level- strong.

Sample № 2 – The aroma is pleasant and intense at below average degree, clean and dense. The taste along with the burning and taxation is at below average level c+, the irritation is up to the average, with medium fullness. The physiological force is at above average level.

Sample № 3 – The aroma is pleasant and clean below average, intense and clean to moderate level. The taste is characterized with burning and taxation under average c-degree, irritation and fullness are below average – moderate. Physiological force is at the average level.

Sample № 4 – This sample has a pleasant aroma and purity below average, intensive and dense below average, the irritation is below average C + level, burning and fullness below average, slight dryness. The physiological force is below average.

It is apparent that with the increase of the filter section length, the smoking properties change. The aroma reduces its intensity, the fullness of flavor decreases; unbalanced defects influence the taste of aromatic complex, and the physiological force decreases. A conclusion can be drawn that the length of filter section increases, while the taste and the intensity of flavor decrease.

The changes of the smoking properties of cigarettes, i.e. their flavor and taste, are presented in Figures 1 and 2, respectively.

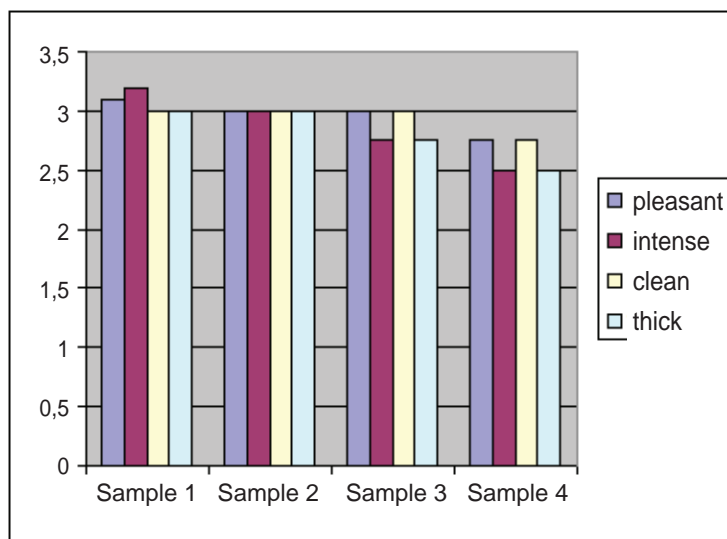


Figure 1 Flavor rating

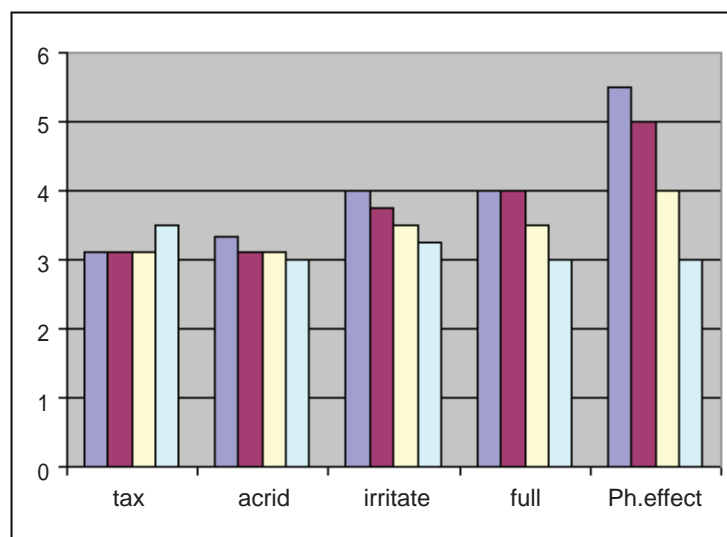


Figure 2 Taste and physiological effect rating

The results on nicotine, tar and carbon monoxide research are presented in Figures 3 and 4.

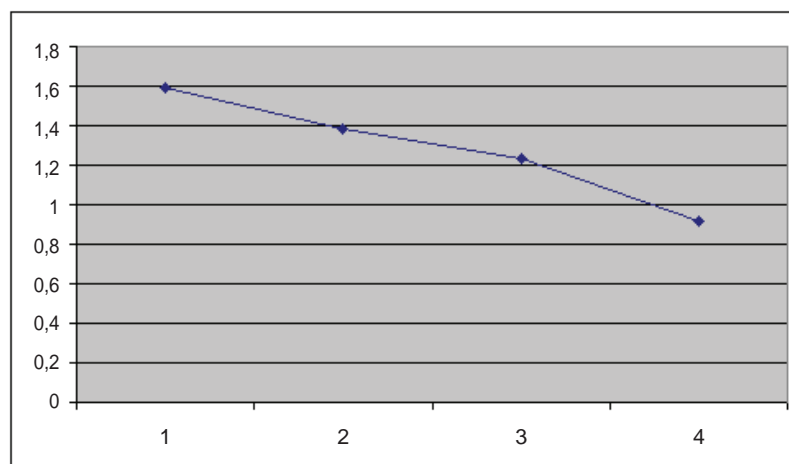


Figure 3 Nicotine, (mg/cig)

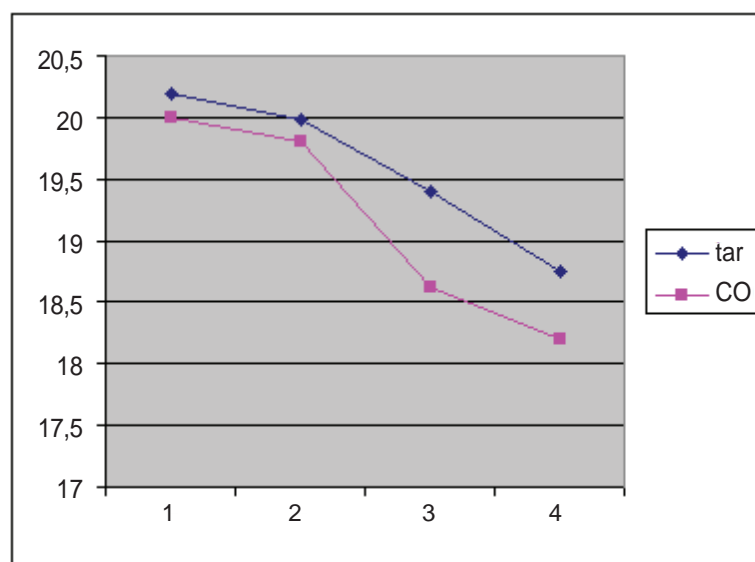


Figure 4 Tar and carbon monoxide, (mg/cig) contents

The results are obtained from laboratory tests and they cannot be taken as absolute values for the reduction of dangerous substances in smoke. However, they are sufficient indicators of the influence of filter segments. There is a strong tendency of proportional increase of

filters efficiency along with their length. It is evident that the smoking properties will be changed. Considering these facts, there cannot be mechanical increase of the length of filter segments, but they must be a part of the design in the formulation of cigarettes.

CONCLUSION

Taking into consideration the results of our research, it can be concluded that the

increase of filter segments enhances their ability of modification.

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