The chlorine and bromine contents in tobacco and tobacco smoke in both the particulate and gaseous phases were studied by neutron-activation analysis. Methyl chloride and methyl bromide concentrations were measured in the gaseous phase by gas-liquid chromatography - mass spectrometry. The chlorine and bromine contents in nine brands of cigarettes were on the average as follows: Tobacco - 6600 ppm chlorine and 110 ppm bromine. Cigarette smoke, particulate phase - 68 μg chlorine and 1 μg bromine per cigarette. Cigarette smoke, gaseous phase - 90 μg chlorine and 5 μg bromine per cigarette. In the gaseous phase methyl chloride accounted for 60% of the total chlorine and methyl bromine for 80% of the total bromine.

INTRODUCTION

Over 3800 compounds have been identified in tobacco smoke\textsuperscript{1}. The largest groups are nitrogen compounds /24%/ and various hydrocarbons /15%/\textsuperscript{2}. The main components
include carbon monoxide /5-23 mg/cigarette/, nicotine /0.1-3.4 mg/cigarette/, acetic acid /0.2-2.2 mg/cigarette/, nitric acid /0.1-1.6 mg/cigarette/, acetaldehyde /0.2-1.3 mg/cigarette/, formic acid /0.1-1.1 mg/cigarette/, methyl chloride /0.1-0.8 mg/cigarette/ and hydrogen cyanide /0.03-0.7 mg/cigarette/. Almost 50 carcinogenic compounds have been identified.

Fishbein lists the following organochlorine compounds identified in tobacco smoke: methyl chloride, methylene chloride, chloroform, trichloroethylene, tetrachloroethylene and vinyl chloride. Methyl chloride, which was identified in tobacco smoke more than 30 years ago, is by far the most important.

The combustion process has been implicated as a significant source of organochlorine compounds, regardless of whether chlorine in the burned material is bound in organic or inorganic compounds. In the combustion of a mixture of methane, hydrogen chloride and oxygen, for example, almost 100 organochlorine compounds have been identified, ranging from small molecular weight aliphatic compounds /combustion temperature 500-750 °C/ to aromatic compounds /chlorinated phenols and some chlorine-containing dioxins and furans, burning at 700-900 °C/ [Ref. 5/].

The aliphatic compounds included in Fischbein’s list of organochlorine compounds in tobacco smoke are similar to those reported in Ref. 5. Methyl bromide is the only other halogen compound having been identified in tobacco smoke.

The main source of the organochlorine and organobromine compounds may be the inorganic chlorine and bromine in tobacco. But they may also originate in part from the chlorine and bromine compounds in pesticides applied to control plant disease and insect pests. For example,