

Letters to the Editor

Tobacco Smoke Components

EDITORS – We studied with great interest your article "Tobacco Smoke Components" in the September 1997 issue of the journal. For clarification, we offer the following comments.

1. Reproducing Table 2 (Approximate number of compounds identified in some major compound classes) of the review 'Methods of Collection of Smoke for Analytical Purposes' by M.F. DUBE and C.R. GREEN (Recent Advan. Tob. Sci. 8 (1982) 48), in your article leaves the reader with the impression that until 1982, a total of 4720 compounds had been identified in tobacco smoke. However, as DUBE and GREEN explained in their text, the number 4720 is greater than the 3875 compounds actually identified, because of the presence of compounds with multiple functional groups which requires their listing in more than one class of compounds.

Perhaps this misunderstanding would not have occurred if the 1988 article by D.L. ROBERTS had been cited, which states in its Table 1 that 3796 compounds in 27 groups have been identified and presents each compound only once in one of the functional groups (Recent Advan. Tob. Sci. 14 (1988) 56).

2. Table 6 of your review article deserves updating. We suggest you replace the table "Biologically active agents in the mainstream smoke of nonfilter cigarettes" with the attached table which reflects our current knowledge more satisfactorily. Although we carefully screened the scientific literature, we do not claim that this list is complete.

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Table 1.
Biologically active agents in the mainstream smoke of nonfilter cigarettes.¹

Smoke Compounds	Amount/Cigarette
Polynuclear Aromatic Hydrocarbons (PAH)	
Benz[a]anthracene (BaA)	20 - 70 ng
Benzo[b]fluoranthene (BbFL)	4 - 22 ng
Benzo[j]fluoranthene (BjFL)	6 - 21 ng
Benzo[k]fluoranthene (BkFIL)	6 - 12 ng
Benzo[a]pyrene (BaP)	20 - 40 ng
Dibenz[a,h]anthracene (DBA)	4 ng
Dibenzo[a,l]pyrene (DBa,LPy)	1.7 - 3.2 ng
Dibenzo[a,e]pyrene (DBa,ePy)	Present
Indeno[1,2,3-cd]pyrene (IndPy)	4 - 20 ng
5-Methylchrysene (5-MeChr)	0.6 ng

Table 1 (contd).

Smoke Compounds		Amount/Cigarette
Heterocyclic Compounds		
Pyridine		16 - 40 µg
Nicotine		1.0 - 3.0 mg
Quinoline		2 - 180 ng
Dibenz[<i>a,h</i>]acridine		0.1ng
Dibenz[<i>a,j</i>]acridine	3	- 10 ng
7 <i>H</i> -Dibenzo[<i>c,g</i>]carbazole		0.9 ng
Furan	18	- 30 ng
Benzo(<i>b</i>)furan		Present
Aromatic Amines		
Aniline	360	- 655 ng
2-Toluidine	30	- 337 ng
2-Naphthylamine	1	- 334 ng
4-Aminobiphenyl	2	- 5.6 ng
N-Heterocyclic Amines		
2-Amino-9 <i>H</i> -pyrido[2,3- <i>b</i>]indole	(AaC)	25 - 260 ng
2-Amino-3-methyl-9 <i>H</i> -pyrido[2,3- <i>b</i>]indole	(MeAaC)	2 - 37 ng
2-Amino-3-methylimidazo[4,5- <i>b</i>]quinoline	(IQ)	0.3 ng
3-Amino-1,4-dimethyl-5 <i>H</i> -pyrido[4,3- <i>b</i>]indole	(Trp-P-1)	0.3 - 0.5 ng
3-Amino-1-methyl-5 <i>H</i> -pyrido[4,3- <i>b</i>]indole	(Trp-P-2)	0.8 - 1.1 ng
2-Amino-6-methyl[1,2- <i>a</i> :3',2''- <i>d</i>]imidazole	(GLu-P-1)	6.37 - 0.89 ng
2-Aminodipyrido[1,2- <i>a</i> :3',2''- <i>d</i>]imidazole	(GLu-P-2)	0.25 - 0.88 ng
2-Amino-1-methyl-6-phenylimidazo[4,5-1]pyridine	(PhIP)	11 - 23 ng
N-Nitrosamines		
<i>N</i> -Nitrosodimethylamine	(DMNA)	2 - 180 ng
<i>N</i> -Nitrosoethylmethylamine	(EMNA)	3 - 13 ng
<i>N</i> -Nitrosodiethylamine	(DENA)	ND - 2.8 ng
<i>N</i> -Nitroso-di- <i>n</i> -propylamine	(DPNA)	ND - 1.0 ng
<i>N</i> -Nitroso-di- <i>n</i> -butylamine	(DBNA)	ND - 30 ng
<i>N</i> -Nitrosopyrrolidine	(NPYR)	3 - 110 ng
<i>N</i> -Nitrosopiperidine	(NPIP)	ND - 9 ng
<i>N</i> -Nitrosodiethanolamine	(NDELA)	ND - 68 ng
<i>N'</i> -Nitrosornicotine	(NNN)	120 - 3.700 ng
<i>N'</i> -Nitrosoanabasine	(NAB)	ND - 150 ng
4-(Methylnitrosamino)-1-(3-pyridyl)-1-butanone	(NNK)	80 - 770 ng

Table 1 (contd).

Smoke Compounds	Amount/Cigarette
Aldehydes	
Formaldehyde	70 - 100 µg
Acetaldehyde	500 - 1.400 µg
Acrolein	60 - 140 µg
Crotonaldehyde	10 - 20 µg
Volatile Hydrocarbons	
1,3-Butadiene	20 - 75 µg
Isoprene	450 - 1.00 µg
Benzene	20 - 70 µg
Styrene	10 µg
Miscellaneous Organic Compounds	
Methanol	100 - 250 µg
Acetamide	38 - 56 µg
Acrylamide	Present
Acrylonitrile	3 - 15 µg
Vinyl chloride (VC)	11 - 15 ng
Ethylene oxide (EO)	7 µg
Ethyl carbamate	20 - 38 ng
1,1-Dimethylhydrazine	Present
Maleic hydrazide (MH)	1.16 µg
Methyl isocyanate	1.5 - 5 µg
2-Nitropropane	0.2 - 2.2 µg
Nitrobenzene	25 µg
Phenol	80 - 160 µg
Catechol	200 - 400 µg
Di-(2-ethylhexyl)phthalate	20 µg
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane (DDT)	800 - 1.200 ng
1,1-Dichloro-2,2-bis(4-chlorophenyl)ethylene (DDE)	200 - 370 ng
Inorganic Compounds	
Carbon monoxide (CO)	10 - 23 mg
Carbon disulfide	0.6 - 2.6 µg
Ammonia	10 - 130 µg
Nitrogen oxides ² (NO _x)	100 - 600 µg
Hydrogen cyanide	400 - 500 µg
Cyanogen	7 - 11 µg

Table 1 (contd).

Smoke Compounds	Amount/Cigarette
Inorganic Compounds (contd.)	
Hydrogen sulfide	10 - 90 µg
Hydrazine	24 - 34 µg
Arsenic	40 - 120 ng
Beryllium	0.3 µg
Nickel	ND - 600 ng
Cobalt	0.13 - 0.2 ng
Chromium	4 - 70 ng
Lead	34 - 85 ng
Mercury	4 ng
Polonium-210	0.03 - 1.0 pCi

ND = Not detected

¹This is not a complete list.

²Unaged smoke contains primarily NO and only traces of NO₂ (< 10 µg).