

How many cigarettes must be smoked to create an ETS danger?

ESTIMATING RELATIVE DOSES OF MSS AND ETS RSP

Acronyms and abbreviations

MSS = Main Stream Smoke, the smoke exhaled by the smoker.

SSS = Side Stream Smoke, the smoke of a smouldering cigarette in the ashtray.

RSP = Respirable Suspended Particles, present in the smoke.

ETS = Environmental Tobacco Smoke, or passive smoke.

Milligram = One thousandth of a gram. Abbreviation: **mg**. One milligram = 0.000 035 273 961 95 ounces.

Microgram = One millionth of a gram, or one thousandth of a milligram. The scientific abbreviation is **µg**.

Cubic metre, meter = 35.314 cubic feet. Abbreviation: **m³**.

TLV = Threshold Limit Value. The TLV of a chemical substance is a level to which it is believed a worker can be exposed day after day for a working lifetime without adverse health effects.

Although certain assumptions are necessary in estimating ETS-RSP doses, they are based on simple facts or on measurements that are fairly well verified. With this in mind, such estimates seem reasonably realistic and less affected by obvious judgmental considerations. Nevertheless, in comparing RSP doses from ETS and MSS exposures it also seems reasonable to present results in analog form rather than as precise point estimates, in recognition of possible uncertainties.

Assuming a prolonged daily exposure of 10 hr, a typical person would be exposed to a daily ETS-RSP dose of roughly 0.3-0.4 mg after breathing ambient air with a 50 µg/m³ ETS-RSP concentration, at the rate of about 0.7 m³/hr (Crawford-Brown, 1987). This is equivalent to over a 1,000-fold reduction compared with the inhaled dose of the average mainstream smoker.

ESTIMATED NUMBER OF CIGARETTES REQUIRED TO REACH TLV LEVELS FROM SSS EMISSION OF SELECTED CHEMICALS IN A SEALED AND UNVENTILATED 100 M³ (3,531.46 Cu. Ft.) ENCLOSURE

SSS component	SSS output (mg/cigarette) *	TLV (mg/ m ³)**	Cigarettes required
Methylchloride	0.88	10.30	1,170
Hydroquinone	0.16	2	1,250
Cadmium	0.0007	0.01	1,430
Acetaldehyde	1.26	180	1,430
Acetic acid	1.5	25	1,660
Nitrogen oxides	2.8	50	1,780
Formic acid	0.525	9.4	1,790
Pyridine	0.39	16	4,100
Phenol	0.25	19	7,600
Methylamine	0.1	13	13,000
Benzene	0.24	32	13,300
Catechol	0.14	23	16,500
Nickel	0.0025	1	40,000
Dimethylamine	0.036	18	50,000
Hydrazine	0.00009	0.13	145,000
Acetone	1	1,780	178,000
Benzo[a]pyrene	0.00009	0.2 ***	222,000
2-Toluidine	0.003	9	300,000
Polonium 210	0.4 pCi	3 pCi/liter ****	750,000
Toluene	0.000035	375	1,000,000

* Data from EPA (1990a), Table C-2, pp. C-19 and 20.

** Data from ACGIH (1990).

*** Based on the TLV for coal tar pitch volatiles.

**** EPA (1990c).

Data from Gori and Mantel, Mainstream and Environmental Tobacco Smoke, *Regulatory Toxicology and Pharmacology* 14, 88-105 (1991). Read and download the entire study at: http://www.data-yard.net/ets_other/gori_mantel_1991.pdf .

Further comments visible at http://www.forces.org/Scientific_Portal/evidence_viewer.php?id=385 .