

Table 3. Levels of emissions from various diesel and gasoline engines (1980–85; US Environmental Protection Agency Federal Test Procedure (FTP) cycle only) and their mutagenicity

	Heavy-duty diesel vehicle	Light-duty diesel vehicle	Light-duty gasoline vehicle	
			Without catalytic converter	With catalytic converter
<i>Gas phase in mg/mile (mg/km)</i>				
Benzene	-	24 ^a (15)	162 ^a (101)	13 ^a (8)
Carbon monoxide	10 000 ^a (6250)	1270 ^b (794)	28 500 ^b (17 813)	12 200 ^b (7625)
Formaldehyde	-	20 ^a (13)	56 ^a (35)	4 ^a (3)
Nitrogen oxides	28 000 ^a (17 500)	1270 ^b (794)	3520 ^b (2200)	2350 ^b (1469)
Propylene	-	-	230 ^a (144)	18 ^a (11)
Toluene	11 ^a (7)	-	215 ^a (134)	32 ^a (20)
<i>Gas-phase PAHs and PAH derivatives in µg/mile (µg/km)^a</i>				
Anthracene	8960 (5600)	2100 (1313)	3200 (2000)	60 (38)
Fluoranthene	1240 (775)	300 (188)	450 (281)	7 (4)
	-	910(569)	300(188)	-
2-Nitrofluorene	-	90 (56)	-	-
Pyrene	1580 (988)	380 (238)	580 (363)	9(6)
	1580 (988)	1130 (706)	200 (125)	-
<i>Particulate-phase PAHs and PAH derivatives in µg/mile (µg/km)</i>				
Anthracene	439 ^a (274)	105 ^a (66)	160 ^a (100)	3 ^a (2)
Benzo[a]pyrene	54 ^a (34)	13 ^a (8)	20 ^a (13)	0.4 ^a (0.3)
	-	1 ^{a,c} (0.6)	(1–10) ^d	(0.1–1) ^d
Benzo[a]pyrene (contd)		-	3 ^e (2)	0.1 ^e (0.06)
	-	-	15 ^f (9)	3 ^f (2)
	142 ^a (89)	34 ^a (21)	15 ^b (9)	2 ^b (1)
Benzo[e]pyrene	64 ^a (40)	15 ^a (9)	23 ^a (14)	0.4 ^a (0.3)
Fluoranthene	933 ^a (538)	224 ^a (140)	340 ^a (213)	5 ^a (3)
	-	683 ^a (427)	225 ^a (141)	-
	-	933 ^a (583)	224 ^a (140)	-
2-Nitrofluorene	-	97 ^a (61)	-	-
1-Nitropyrene	45 ^a (28)	11 ^a (7)	0.3 ^a (0.2)	<0.1 ^a (<0.06)
	-	4 ^c (3)	0.2 ^f (0.1)	0.2 ^f (0.1)
		8 ^b (5)	0.2 ^b (0.1)	0.2 ^b (0.1)

	Heavy-duty diesel vehicle	Light-duty diesel vehicle	Light-duty gasoline vehicle	
			Without catalytic converter	With catalytic converter
Pyrene	1182 ^a (739)	284 ^a (178)	431 ^a (269)	7 ^a (4)
	-	848 ^a (530)	150 ^a (94)	-
	-	284 ^f (178)	19 ^f (12)	10 ^f (6)
	-	39 ^{a,c} (24)	47 ^a (29)	26 ^a (16)
Total PAH		200–1000 ^g (125–625)		
<i>Other emissions</i>				
Total particulate phase				
in mg/km	1036 ^h	246 ^h	62 ^h	11 ^h
in mg/mile (mg/km)	-	-	103 ^f (64)	32 ^f (20)
Total extractable matter				
in mg/km	188 ^h	124 ^h	10 ^h	6 ^h
in mg/mile(mg/kg)	-	-	21 ^f (13)	14 ^f (9)
<i>Mutagenicity</i>				
TA98 (without activation)				
rev/km	226 ^h	595 000 ^h	61 000 ^h	30 000 ^h
rev/mile	-	99 000 ^{a,c}	15 000 ^a	4000 ^a
rev/mile	-	509 000 ^b	152 000 ^b	41 000 ^b
TA98 (with activation)				
rev/mile	-	590 ^{a,c}	260 ^f	80 ^f
rev/km	40 000–530 000 ⁱ	240 000– 320 000	180 000 ⁱ	30 000 ⁱ
rev/mile	-	-	258 000 ^b	71 000 ^b

a From Schuetzle & Frazier (1986);

b from Zweidinger (1982);

c see Table 4, 22% fuel aromaticity;

d from Holmberg & Ahlberg (1983) [assumed to be FTP cycle];

e from Williams & Swarin (1979)

f from Lang *et al.* (1981);

g from Clark *et al.* (1982b);

h from Schuetzle (1983);

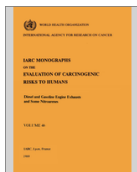
i from Lewtas & Williams (1986)

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