MMWR TABLE S3-1. Air changes per hour (ACH) and time in minutes/hours required for removal efficiencies of 90%, 99% and 99.9% of airborne contaminates*

Time required for a removal efficiency of:

ACH	90.0%		99.0%		99.9%	
	Min	Hrs	Min	Hrs	Min	Hrs
1	138	2.3	276	4.6	414	6.9
2	69	1.2	138	2.3	207	3.5
3	46	0.8	92	1.5	138	2.3
4	35	0.6	69	1.2	104	1.7
5	28	0.5	55	0.9	83	1.4
6	23	0.4	46	0.8	69	1.2
7	20	0.3	39	0.7	59	1.0
8	17	0.3	35	0.6	52	0.9
9	15	0.3	31	0.5	46	0.8
10	14	0.2	28	0.5	41	0.7
11	13	0.2	25	0.4	38	0.6
12	12	0.2	23	0.4	35	0.6
13	11	0.2	21	0.4	32	0.5
14	10	0.2	20	0.3	30	0.5
15	9	0.2	18	0.3	28	0.5
16	9	0.2	17	0.3	26	0.4
17	8	0.1	16	0.3	24	0.4
18	8	0.1	15	0.3	23	0.4
19	7	0.1	15	0.3	22	0.4
20	7	0.1	14	0.2	21	0.4
25	6	0.1	11	0.2	17	0.3
30	5	0.1	9	0.2	14	0.2
35	4	0.1	8	0.1	12	0.2
40	3	0.1	7	0.1	10	0.2
45	3	0.1	6	0.1	9	0.2
50	3	0.1	6	0.1	8	0.1

*This table has been adapted from the formula for the rate of purging airborne contaminants (99). Values have been derived from the formula $t_1 = [\ln (C_2 \div C_1) \div (Q \div V)] \times 60$, with $T_1 = 0$ and $C_2 \div C_1 - $ (removal efficiency $\div 100$), and where:

t_1 = initial timepoint
C_1 = initial concentration of contaminant
C_2 = final concentration of contaminants
Q = air flow rate (cubic feet per hour)
V = room volume (cubic feet)
$Q \div V$ = ACH

The times given assume perfect mixing of the air within the space (i.e., mixing factor = 1). However, perfect mixing usually does not occur, and the mixing factor could be as high as 10 if air distribution is very poor (98). The required time is derived by multiplying the appropriate time from the table by the mixing factor that has been determined for the booth or room. The factor and required time should be included in the operating instructions provided by the manufacturer of the booth or enclosure, and these instructions should be followed.