

TABLE 3. PHYSIOLOGICAL RESPONSE TO GASES AND VAPORS*
Concentrations in Parts of Substance per Million Parts of Air by Volume (ppm)

SUBSTANCE	RAPIDLY FATAL	DANGEROUS TO LIFE IN $\frac{1}{4}$ TO 1 Hr	MAXIMUM ALLOW- ABLE CONCENTRATION FOR DAILY EXPOSURES
Acrolein.....	2,000	100	0.5
Ammonia.....	5,000	2,500	100
Amyl acetate.....	.....	.....	200
Aniline.....	.....	200	5
Arsine.....	250	10	0.05
Benzene (benzol).....	20,000	5,000	100 ^b
Bromine.....	500	40	1
Butyl acetate.....	.....	10,000	200
Carbon dioxide.....	100,000	50,000	5,000
Carbon disulfide.....	2,000	1,000	20 ^b
Carbon monoxide.....	4,000	1,000	100 ^b
Carbon tetrachloride.....	50,000	.....	50
Chlorine.....	1,000	10	1
Dichlorobenzene.....	.....	.....	50
Dichloroethyl ether.....	.....	500	15
Ether (diethyl).....	.....	35,000	400
Ethyl acetate.....	40,000	10,000	400
Ethyl alcohol.....	.....	.....	1,000
Ethylene dichloride.....	.....	4,000	100
Formaldehyde.....	.....	.....	10 ^b
Gasoline.....	.....	.....	500
Hydrogen chloride.....	1,000	.....	10
Hydrogen cyanide.....	200	100	20
Hydrogen fluoride.....	.....	50	3
Hydrogen sulfide.....	600	200	20 ^b
Methyl acetate.....	.....	.....	200
Methyl alcohol (Methanol).....	.....	.....	200 ^b
Methyl bromide.....	20,000	2,000	20
Methyl chloride.....	150,000	20,000	100
Methylene chloride.....	.....	.....	500
Monochlorobenzene.....	.....	.....	75
Nitrobenzene.....	.....	.....	1
Nitrogen oxides.....	300	100	25 ^b
Phosgene.....	50	5	1
Phosphine.....	1,000	400	0.05
Styrene.....	.....	.....	400 ^b
Sulfur dioxide.....	400	150	10
Tetrachloroethane.....	7,000	.....	5
Tetrachloroethylene.....	.....	.....	100
Toluene (toluol).....	20,000	5,000	200
Trichloroethylene.....	.....	.....	200 ^b
Turpentine.....	.....	.....	100
Xylene (xylol).....	20,000	5,000	200 ^b

* Adapted from: Manual of Industrial Hygiene, by W. M. Caisler et al. U. S. Public Health Service (W. B. Saunders Co., 1943); Analytical Chemistry of Industrial Poisons, Hazards and Solvents, by M. B. Jacobs (Interscience Publishers, 1941); Noxious Gases, by Henderson and Haggard (Reinhold Publishing Co., N. Y., 1943). Report of the Committee on Threshold Limits of the American Conference of Governmental Industrial Hygienists; and other authoritative sources.

^b Adopted by the American Standards Association (American Standard Z-37)

Control of outdoor odor nuisance is especially troublesome because of the extremely minute quantities of contaminant that are capable of offending through a wide area. New industrial chemicals with strange or unfamiliar odors tend to receive more attention from the neighborhood than the customary odors generated by well known processes and raw materials. Methods of odor control currently in use include charcoal adsorption, scrubbing towers and air washers, chlorination, condensation, masking, passage of the odorous air through combustion chambers, and best of all, substitution of less offensive materials whenever possible^{8, 9, 10, 11}.

Control of air quality within buildings ventilated for human occupancy is discussed in Chapter 12. Tobacco smoke odors, cooking odors and

TABLE 4. MAXIMUM ALLOWABLE CONCENTRATIONS OF DUSTS, FUMES AND MISTS*

SUBSTANCE	MILLIGRAMS PER CUBIC METER, DAILY EXPOSURES ^b
Antimony.....	0.1
Arsenic; arsenic trioxide.....	0.15 ^c
Cadmium, and compounds.....	0.1 ^c
Chlorodiphenyls.....	1.0
Chromic acid mist and Chromates (as CrO ₃).....	0.1
Fluorides.....	2.5
Lead; lead carbonate; lead chloride; lead nitrate; lead oxides; lead sulfate.....	0.15 ^c
Manganese, and compounds.....	6.0 ^c
Mercury, and compounds.....	0.1
Pentachloronaphthalene.....	0.5
Selenium.....	0.1
Tellurium.....	0.1
Trichloronaphthalene.....	5.0
Trinitrotoluene.....	1.5
Zinc oxide fume.....	15.0

* Recommendations of state and local industrial hygiene agencies and other authoritative sources.

^b 1 milligram per cubic meter = 0.44 grain per 1000 cu ft.

^c Adopted by the American Standards Association (American Standard Z-37).

body odors are air contaminants of the nuisance type which now command a decisive position in the standards of air quality for indoor comfort. However, the engineer will find, at times, that odors originating outside buildings in industrial or business districts may determine the kind and capacity of equipment he must provide for a high quality air supply installation.

INDUSTRIAL AIR CONTAMINANTS

Many industrial processes are sources of contaminants. Their control is an important function of the ventilating or air conditioning engineer, because the atmosphere within buildings is the medium whereby such finely divided matter is dispersed and transported from the source to remote locations where it may cause property damage, nuisance, fire, explosion, disease and even death.

Tables 3, 4 and 5 give the maximum allowable concentrations for industrial air contaminants as currently accepted in most sections of the country. They apply to exposures of 8 hours per day, and refer to the quantities of contaminant permissible in the workers' breathing zone. Some of these figures may be altered as the result of continuous research, and some may differ from those in force in a few cities or states. The