

TABLE 6. APPROXIMATE LIMITS OF FLAMMABILITY OF SINGLE GASES AND VAPORS IN AIR AT ORDINARY TEMPERATURES AND PRESSURES^a

GAS OR VAPOR	LOWER LIMIT PER CENT BY VOLUME	UPPER LIMIT PER CENT BY VOLUME	Closed Cup FLASH POINT °F DEG. ^a
Acetaldehyde.....	4.0	57	-17
Acetone.....	2.1	13.0	0
Acetylene ^b	2.5	80	.....
Allyl alcohol.....	2.4	.....	70
Ammonia.....	16.0	27.0	.....
Amyl alcohol.....	1.2	.....	91
Amyl chloride.....	1.4	.....	.....
Amylene.....	1.6	.....	.....
Benzene (benzol).....	1.4	8.0	12
Benzyl chloride.....	1.1	.....	140
Butane.....	1.6	8.5	-76
Butyl acetate.....	1.7	15.0	72
Butyl alcohol.....	1.7	.....	84
Butylene.....	1.7	9.0	.....
Carbon disulfide.....	1.0	50	-22
Carbon monoxide.....	12.5	74	.....
Crotonaldehyde.....	2.1	15.5	55
Cyclohexane.....	1.3	8.4	1
Cyclopropane.....	2.4	10.3	.....
Decane.....	0.67	2.6	115
Dichloroethylene (1, 2).....	9.7	12.8	43
Diethyl selenide.....	2.5	.....	.....
Dioxan.....	2.0	22.2	65
Ethane.....	3.1	15.0	.....
Ether (diethyl).....	1.7	48.0	-20
Ethyl acetate.....	2.2	11.5	24
Ethyl alcohol.....	3.3	19.0	55
Ethyl bromide.....	6.7	11.3	.....
Ethyl cellosolve.....	2.6	15.7	104
Ethyl chloride.....	3.6	14.8	-58
Ethylene.....	3.0	34.0	.....
Ethylene dichloride.....	6.2	15.9	56
Ethyl formate.....	2.7	16.5	-4
Ethyl nitrite.....	3.0	.....	-31
Ethylene oxide.....	3.0	80	.....
Furfural (125 C).....	2.1	.....	140
Gasoline.....	1.3	6.5	-50
Heptane.....	1.0	6.0	25
Hexane.....	1.2	6.9	-7
Hydrogen cyanide.....	5.6	40.0	0
Hydrogen.....	4.1	74	.....
Hydrogen sulfide.....	4.3	45.5	.....
Illuminating gas.....	5.3	31.0	.....
Iso-butyl alcohol.....	1.7	.....	82
Iso-pentane.....	1.3	.....	.....
Iso-propyl acetate.....	1.8	7.8	43
Iso-propyl alcohol.....	2.5	.....	53
Methane ^b	5.0	15.0	.....

^aAdapted from: Limits of Inflammability of Gases and Vapors, by H. F. Coward and G. W. Jones (U. S. Bureau of Mines, Bulletin No. 279, 1939); Properties of Flammable Liquids, Gases and Solids (Associated Factory Mutual Fire Ins. Co., January, 1940); and National Fire Codes for Flammable Liquids, Gases, Chemicals and Explosives—1945 (National Fire Protection Association).

^bTurbulent mixture.

^cClosed cup refers to the equipment used in flash point determinations.

TABLE 6. APPROXIMATE LIMITS OF FLAMMABILITY OF SINGLE GASES AND VAPORS IN AIR AT ORDINARY TEMPERATURES AND PRESSURES^a (Continued)

GAS OR VAPOR	LOWER LIMIT PER CENT BY VOLUME	UPPER LIMIT PER CENT BY VOLUME	Closed Cup FLASH POINT °F DEG. ^a
Methyl acetate.....	3.1	15.5	15
Methyl alcohol.....	6.0	36.5	54
Methyl bromide.....	13.5	14.5	.....
Methyl butyl ketone.....	1.2	8.0	.....
Methyl chloride.....	8.0	19.7	.....
Methyl cyclohexane.....	1.1	.....	25
Methyl ethyl ether.....	2.0	10.1	-35
Methyl ethyl ketone.....	1.8	11.5	30
Methyl formate.....	5.0	22.7	-2
Methyl propyl ketone.....	1.5	8.2	.....
Natural gas.....	4.8	13.5	.....
Naptha (benzine).....	1.1	6.0	20-45
Naphthalene.....	0.9	.....	174
Nonane.....	0.74	2.9	88
Octane.....	0.84	3.2	56
Paraldehyde.....	1.3	.....	.....
Pentane.....	1.4	8.0	.....
Propane.....	2.4	9.5	.....
Propyl acetate.....	1.8	8.0	58
Propyl alcohol.....	2.5	.....	59
Propylene.....	2.0	11.1	.....
Propylene dichloride.....	3.4	14.5	59
Propylene oxide.....	2.1	21.5	.....
Pyridine (70 C).....	1.8	12.4	68
Toluene (toluol).....	1.3	7.0	40
Turpentine.....	0.8	.....	95
Vinyl ether.....	1.7	27.0	.....
Vinyl chloride.....	4.0	22.0	.....
Water gas (variable).....	6.0	70	.....
Xylene (xylol).....	1.0	6.0	63

meter of air. Maximum pressures generated have been reported as high as 500 psi, although they are more likely to be of the order of 50 psi. Investigations on the flammable characteristics of dusts are currently made at 0.1 and 0.5 oz per cubic foot¹⁵⁻²¹.

ATMOSPHERIC POLLEN

The properties of pollen grains discharged by weeds, grasses and trees and responsible for hay fever are of special interest to engineers who design equipment for their removal from indoor air (see Allergic Disorders in Chapter 13, and Air Cleaning Devices, Chapter 33). Whole grains and fragments transported by the air range chiefly between 10 and 50 microns in size, but some have been measured as small as 5 microns and others over 100 microns in diameter. Ragweed pollen grains are fairly uniform in size within the range of 15 to 25 microns.

Pollen grains can be removed from the air more readily than the particles of dust prevalent in outdoor air and found near dusty industrial processes, since the latter predominate in the range of 0.1 to 10 microns in size.

Most grains are quite hygroscopic and therefore vary in weight with the