

APPENDIX A. — SUMMARY OF COMBUSTION PROPERTIES OF LIQUID AND GASEOUS COMPOUNDS¹ (GASEOUS COMBUSTION IN AIR AT ATMOSPHERIC PRESSURE)

Combustible	Formula	Mol wt	Sp gr (air = 1)	BP, °C	C _{st} (in air), vol pct	ΔH _i (25° C), kcal/mol	ΔH _c (net, 25° C), kcal/mol	Flash-point, °C	Minimum AIT, °C	Flammable limits	
										L ₂₅ , vol pct	U ₂₅ , vol pct
PARAFFINIC HYDROCARBONS (STRAIGHT-CHAIN ALKANES)											
Methane	CH ₄	16.04	0.55	-164	9.48	-17.9	191.8	² -188	630	5.0	15.0
Ethane	C ₂ H ₆	30.07	1.04	-89	5.65	-20.2	341.3	² -135	515	3.0	12.4
Propane	C ₃ H ₈	44.11	1.52	-42	4.02	-24.8	488.5	² -104	450	2.1	9.5
n-Butane	C ₄ H ₁₀	58.12	2.01	-5	3.12	-30.2	635.4	² -74	370	1.8	8.4
n-Pentane	C ₅ H ₁₂	72.15	2.49	36	2.55	-35.0	782.0	² -49	260	1.4	7.8
n-Hexane	C ₆ H ₁₄	86.18	2.98	69	2.16	-40.0	928.9	-23	225	1.2	7.4
n-Heptane	C ₇ H ₁₆	100.21	3.46	98	1.87	-44.9	1,075.8	-3	225	1.1	6.7
n-Octane	C ₈ H ₁₈	114.23	3.94	126	1.65	-49.8	1,222.8	14	220	.95	6.5
n-Nonane	C ₉ H ₂₀	128.26	4.43	151	1.47	-54.7	1,369.7	31	205	.85	NA
n-Decane	C ₁₀ H ₂₂	142.29	4.91	174	1.33	-59.7	1,516.6	46	210	.75	5.6
n-Dodecane	C ₁₂ H ₂₆	170.33	5.88	215	1.12	-69.5	1,810.5	74	204	.60	NA
n-Tetradecane	C ₁₄ H ₃₀	198.38	6.85	253	.97	-79.4	2,104.3	107	200	.50	NA
n-Hexadecane	C ₁₆ H ₃₄	226.45	7.82	287	.85	-89.2	2,398.2	² 126	205	.43	NA
PARAFFINIC HYDROCARBONS (BRANCHED-CHAIN ALKANES)											
2-Methylpropane (isobutane)	C ₄ H ₁₀	58.12	2.07	-12	3.12	-32.2	634	² -81	460	1.8	8.4
2-Methylbutane (isopentane)	C ₅ H ₁₂	72.15	2.49	28	2.55	-36.9	780	< -50	420	1.4	7.6
2-Methylpentane	C ₆ H ₁₄	86.18	3.0	60	2.16	-41.7	927	NA	306	1.2	7.0
2,2-Dimethylpropane (neopentane)	C ₅ H ₁₂	72.15	2.5	10	2.55	-39.7	777	NA	450	1.4	7.5
2,2-Dimethylbutane	C ₆ H ₁₄	86.18	3.0	50	2.16	-44.4	925	-48	425	1.2	7.0
2,3-Dimethylpentane	C ₇ H ₁₆	100.21	3.5	90	1.87	-47.6	1,073	NA	335	1.1	6.8
2,2,3-Trimethylbutane	C ₇ H ₁₆	100.21	3.46	81	1.87	-49.0	1,072	NA	420	1.0	NA
2,2,4-Trimethylpentane (isooctane)	C ₈ H ₁₈	114.23	3.9	99	1.65	-53.6	1,219	-12	415	.95	6.0
2,2,3,3-Tetramethylpentane	C ₉ H ₂₀	128.26	4.4	134	1.47	-56.7	1,368	NA	430	.80	4.9
3,3-Diethylpentane	C ₉ H ₂₀	128.26	4.4	146	1.47	-55.4	1,369	NA	290	.70	5.7
UNSATURATED HYDROCARBONS (ALKENES AND DIENES)											
Ethylene (ethene)	C ₂ H ₄	28.05	0.97	-104	6.53	12.5	316.2	NA	490	2.7	36
Propylene (propene)	C ₃ H ₆	42.08	1.45	-47	4.45	4.9	460.4	NA	460	2.4	11
α-Butylene (1-butene)	C ₄ H ₈	56.12	1.94	-6.3	3.37	-.03	607.7	NA	385	1.6	10
β-Butylene (2-butene)	C ₄ H ₈	56.12	1.94	3.7	3.37	-1.7	606.0	NA	325	1.7	9.7
n-Amylene (1-pentene)	C ₅ H ₁₀	70.14	2.42	30	2.72	-5.0	754.3	-18 oc	275	1.4	8.7
3-Methyl-1-butene	C ₅ H ₁₀	70.14	2.42	20	2.72	-6.9	752.3	NA	365	1.5	9.1
Propadiene (allene)	C ₃ H ₄	40.07	1.38	-35	4.97	45.9	443.7	NA	NA	2.2	NA
1,3-Butadiene	C ₄ H ₆	54.09	1.87	-4.4	3.67	26.3	576.3	NA	420	2.0	12
2-Methyl-1,3-butadiene (isoprene)	C ₅ H ₈	68.11	2.40	34	2.90	18.1	720	-54	460	2.0	9
UNSATURATED HYDROCARBONS (ACETYLENES)											
Acetylene (ethyne)	C ₂ H ₂	26.04	0.91	-84	7.73	54.2	300.1	NA	305	2.5	100
Methylacetylene (propyne)	C ₃ H ₄	40.07	1.40	-23	4.97	44.3	442.1	NA	340	1.7	NA
CYCLIC HYDROCARBONS (SATURATES)											
Cyclopropane (trimethylene)	C ₃ H ₆	42.08	1.45	-33	4.45	12.7	465	² 92	500	2.4	10.4
Cyclobutane	C ₄ H ₈	56.12	1.94	12	3.37	6.4	614	NA	NA	1.8	NA
Cyclopentane	C ₅ H ₁₀	70.14	2.42	49	2.72	-18.5	740.8	NA	380	1.5	NA
Cyclohexane	C ₆ H ₁₂	84.16	2.91	81	2.27	-29.4	881.7	-20	245	1.3	7.8
Cycloheptane	C ₇ H ₁₄	98.19	3.39	118	1.96	-28.5	1,034	NA	NA	1.1	6.7
Ethylcyclobutane	C ₆ H ₁₂	84.16	2.91	71	2.27	NA	880	NA	210	1.2	7.7
Ethylcyclopentane	C ₇ H ₁₄	98.19	3.39	104	1.96	-30.4	1,033	NA	260	1.1	6.7
Methylcyclohexane	C ₇ H ₁₄	98.19	3.39	101	1.96	-37.0	1,026	-4	250	1.1	6.7
Ethylcyclohexane	C ₈ H ₁₆	112.21	1.71	132	1.71	-41.1	1,174	35	260	.95	6.6
Diethylcyclohexane	C ₁₀ H ₂₀	140.26	NA	174	1.38	NA	NA	49	240	.80	6.0
Pinane	C ₁₀ H ₁₈	138.26	NA	169	1.42	NA	NA	NA	NA	.74	7.2
Bicyclohexyl	C ₁₂ H ₂₂	166.31	5.7	238	1.18	-77.6(l)	1,687	74	245	.65	5.1
Isopropyl bicyclohexyl	C ₁₅ H ₂₈	208.37	NA	283	.94	-54.9(l)	2,165	124	230	.52	4.1

See footnotes on page 77.

Kuchta, J. M. (1985). Investigation of fire and explosion accidents in the chemical, mining, and fuel-related industries-a manual. Bulletin 680, U.S. Bureau of Mines.