

Table C.1: Heat Capacities of Gases in the Ideal-Gas State[†]

Constants in equation $C_p^{ig}/R = A + BT + CT^2 + DT^{-2}$ T (kelvins) from 298 to T_{\max}

Chemical species	T_{\max}	$C_{P_{298}}^{ig}/R$	A	$10^3 B$	$10^6 C$	$10^{-5} D$
Paraffins:						
Methane	CH ₄	1500	4.217	1.702	9.081	-2.164
Ethane	C ₂ H ₆	1500	6.369	1.131	19.225	-5.561
Propane	C ₃ H ₈	1500	9.011	1.213	28.785	-8.824
<i>n</i> -Butane	C ₄ H ₁₀	1500	11.928	1.935	36.915	-11.402
<i>iso</i> -Butane	C ₄ H ₁₀	1500	11.901	1.677	37.853	-11.945
<i>n</i> -Pentane	C ₅ H ₁₂	1500	14.731	2.464	45.351	-14.111
<i>n</i> -Hexane	C ₆ H ₁₄	1500	17.550	3.025	53.722	-16.791
<i>n</i> -Heptane	C ₇ H ₁₆	1500	20.361	3.570	62.127	-19.486
<i>n</i> -Octane	C ₈ H ₁₈	1500	23.174	4.108	70.567	-22.208
1-Alkenes:						
Ethylene	C ₂ H ₄	1500	5.325	1.424	14.394	-4.392
Propylene	C ₃ H ₆	1500	7.792	1.637	22.706	-6.915
1-Butene	C ₄ H ₈	1500	10.520	1.967	31.630	-9.873
1-Pentene	C ₅ H ₁₀	1500	13.437	2.691	39.753	-12.447
1-Hexene	C ₆ H ₁₂	1500	16.240	3.220	48.189	-15.157
1-Heptene	C ₇ H ₁₄	1500	19.053	3.768	56.588	-17.847
1-Octene	C ₈ H ₁₆	1500	21.868	4.324	64.960	-20.521
Miscellaneous organics:						
Acetaldehyde	C ₂ H ₄ O	1000	6.506	1.693	17.978	-6.158
Acetylene	C ₂ H ₂	1500	5.253	6.132	1.952	..... -1.299
Benzene	C ₆ H ₆	1500	10.259	-0.206	39.064	-13.301
1,3-Butadiene	C ₄ H ₆	1500	10.720	2.734	26.786	-8.882
Cyclohexane	C ₆ H ₁₂	1500	13.121	-3.876	63.249	-20.928
Ethanol	C ₂ H ₆ O	1500	8.948	3.518	20.001	-6.002
Ethylbenzene	C ₈ H ₁₀	1500	15.993	1.124	55.380	-18.476
Ethylene oxide	C ₂ H ₄ O	1000	5.784	-0.385	23.463	-9.296
Formaldehyde	CH ₂ O	1500	4.191	2.264	7.022	-1.877
Methanol	CH ₄ O	1500	5.547	2.211	12.216	-3.450
Styrene	C ₈ H ₈	1500	15.534	2.050	50.192	-16.662
Toluene	C ₇ H ₈	1500	12.922	0.290	47.052	-15.716
Miscellaneous inorganics:						
Air		2000	3.509	3.355	0.575	..... -0.016
Ammonia	NH ₃	1800	4.269	3.578	3.020	..... -0.186
Bromine	Br ₂	3000	4.337	4.493	0.056	..... -0.154
Carbon monoxide	CO	2500	3.507	3.376	0.557	..... -0.031
Carbon dioxide	CO ₂	2000	4.467	5.457	1.045	..... -1.157
Carbon disulfide	CS ₂	1800	5.532	6.311	0.805	..... -0.906
Chlorine	Cl ₂	3000	4.082	4.442	0.089	..... -0.344
Hydrogen	H ₂	3000	3.468	3.249	0.422	..... 0.083
Hydrogen sulfide	H ₂ S	2300	4.114	3.931	1.490	..... -0.232
Hydrogen chloride	HCl	2000	3.512	3.156	0.623	..... 0.151
Hydrogen cyanide	HCN	2500	4.326	4.736	1.359	..... -0.725
Nitrogen	N ₂	2000	3.502	3.280	0.593	..... 0.040
Nitrous oxide	N ₂ O	2000	4.646	5.328	1.214	..... -0.928
Nitric oxide	NO	2000	3.590	3.387	0.629	..... 0.014
Nitrogen dioxide	NO ₂	2000	4.447	4.982	1.195	..... -0.792
Dinitrogen tetroxide	N ₂ O ₄	2000	9.198	11.660	2.257	..... -2.787
Oxygen	O ₂	2000	3.535	3.639	0.506	..... -0.227
Sulfur dioxide	SO ₂	2000	4.796	5.699	0.801	..... -1.015
Sulfur trioxide	SO ₃	2000	6.094	8.060	1.056	..... -2.028
Water	H ₂ O	2000	4.038	3.470	1.450	..... 0.121

[†]Selected from H. M. Spencer, *Ind. Eng. Chem.*, vol. 40, pp. 2152-2154, 1948; K. K. Kelley, *U.S. Bur. Mines Bull.* 584, 1960; L. B. Pankratz, *U.S. Bur. Mines Bull.* 672, 1982.