

30.2: Thermodynamic Data of Organic Substances at 298 K

Formula:	Name:	$\Delta_f H^\ominus$ [kJ/mol]	$\Delta_f G^\ominus$ [kJ/mol]	S^\ominus [J/(mol K)]	C_P [J/(mol K)]
CHBr ₃	Bromoform(g)	25	16	331	71
CHCl ₃	Chloroform(l)	-134.1	-73.7	201.7	114.2
CHCl ₃	Chloroform(g)	-102.7	6.0	295.7	65.7
CH ₂ O ₂	Formic acid(l)	-425	-361.4	129	99
CH ₂ O ₂	Formic acid(g)	-378.7			
CH ₃	Methyl(g)	145.7	47.9	194.2	38.7
CH ₃ Br	Bromomethane(l)	-59.8			
CH ₃ Br	Bromomethane(g)	-35.4	-26.3	246.4	42.4
CH ₃ Cl	Chloromethane(g)	-81.9	-63	234.6	40.8
CH ₃ F	Fluormethane(g)	-234	-210	222.9	37.5
CH ₃ I	Iodomethane(l)	-13.6		136.2	126
CH ₃ I	Iodomethane(g)	14.4	16	254.1	44.1
CH ₃ NO ₂	Nitromethane(l)	-112.6	-14.4	171.8	106.6
CH ₃ NO ₂	Nitromethane(g)	-80.8	-7	282.9	55.5
CH ₄	Methane(g)	-74.6	-50.5	186.3	35.7
CH ₄ O	Methanol(l)	-239.2	-166.6	126.8	81.1
CH ₄ O	Methanol(g)	-201	-162.3	239.9	44.1
CH ₅ N	Methylamine(l)	-47.3	35.7	150.2	102.1
CH ₅ N	Methylamine(g)	-22.5	32.7	242.9	50.1
C ₂ H ₂	Ethyne (acetylene)(g)	226.9	209	201	44
C ₂ H ₄	Ethene(g)	52.5	68.4	219.3	42.9
C ₂ H ₄ O ₂	Acetic acid(l)	-484.3	-389.9	159.8	123.3
C ₂ H ₄ O ₂	Acetic acid(g)	-432.2	-374.2	283.5	63.4
C ₂ H ₅ Br	Bromoethane(l)	-90.5	-25.8	198.7	100.8
C ₂ H ₅ Br	Bromoethane(g)	-61.9	-23.9	286.7	64.5
C ₂ H ₅ Cl	Chloroethane(l)	-136.8	-59.3	190.8	104.3
C ₂ H ₅ Cl	Chloroethane(g)	-112.1	-60.4	276	62.8
C ₂ H ₅ NO ₂	Nitroethane(l)	-143.9			134.4
C ₂ H ₅ NO ₂	Nitroethane(g)	-103.8	-5	320.5	79
C ₂ H ₆	Ethane(g)	-84	-32	229.2	52.5

Formula:	Name:	$\Delta_f H^\ominus$ [kJ/mol]	$\Delta_f G^\ominus$ [kJ/mol]	S^\ominus [J/(mol K)]	C_P [J/(mol K)]
C ₂ H ₆ O	Ethanol(l)	-277.6	-174.8	160.7	112.3
C ₂ H ₆ O	Ethanol(g)	-234.8	-167.9	281.6	65.6
C ₂ H ₆ O	Methoxymethane(l)	-203.3			
C ₂ H ₆ O	Methoxymethane(g)	-184.1	-112.6	266.4	
C ₂ H ₇ N	Ethylamine(l)	-74.1			130
C ₂ H ₇ N	Ethylamine(g)	-47.5	36.3	283.8	71.5
C ₃ H ₄	Cyclopropene(g)	277.1	286	244	53
C ₃ H ₄	Propyne(g)	185	194	248	61
C ₃ H ₆	Cyclopropane(l)	35.2			
C ₃ H ₆	Cyclopropane(g)	53.3	104.5	237.5	55.6
C ₃ H ₆	Propene(g)	20	62	267	64
C ₃ H ₆ O	Acetone(l)	-248.4		199.8	126.3
C ₃ H ₆ O	Acetone(g)	-217.1	-152.7	295.3	74.5
C ₃ H ₆ O ₂	Propanoic acid(l)	-510.7		191	152.8
C ₃ H ₆ O ₂	Propanoic acid(g)	-455.7			
C ₃ H ₈	Propane(l)	-120.9			
C ₃ H ₈	Propane(g)	-103.8	-23.4	270.3	73.6
C ₃ H ₈ O	1-Propanol(l)	-302.6		193.6	143.9
C ₃ H ₈ O	1-Propanol(g)	-255.1		322.6	85.6
C ₃ H ₈ O	2-Propanol(l)	-318.1		181.1	156.5
C ₃ H ₈ O	2-Propanol(g)	-272.6		309.2	89.3
C ₃ H ₉ N	1-Propanamine(g)	-72	40	324	
C ₄ H ₆	1-Butyne(l)	141.4			
C ₄ H ₆	1-Butyne(g)	165.2	202	291	81
C ₄ H ₆	2-Butyne(l)	119.1			
C ₄ H ₆	2-Butyne(g)	145.7	185	283	78
C ₄ H ₆	Cyclobutene(g)	156.7	175	64	64
C ₄ H ₈	2-Methyl-1-propene(g)	-17	58	294	89
C ₄ H ₈	1-Butene(l)	-20.8		227	118
C ₄ H ₈	1-Butene(g)	0.1	71	306	86
C ₄ H ₈	Cyclobutane(l)	3.7			
C ₄ H ₈	Cyclobutane(g)	27.7	110	265	
C ₄ H ₈ O ₂	Butanoic acid(l)	-533.8		222.2	178.6
C ₄ H ₈ O ₂	Butanoic acid(g)	-475.9			

Formula:	Name:	$\Delta_f H^\ominus$ [kJ/mol]	$\Delta_f G^\ominus$ [kJ/mol]	S^\ominus [J/(mol K)]	C_P [J/(mol K)]
C ₄ H ₁₀	2-Methylpropane(g)	−135	−21	295	97
C ₄ H ₁₀	Butane(l)	−147.3			140.9
C ₄ H ₁₀	Butane(g)	−125.7	−17	310	98
C ₄ H ₁₀ O	1-Butanol(l)	−327.3		225.8	177.2
C ₄ H ₁₀ O	1-Butanol(g)	−274.9			
C ₄ H ₁₀ O	2-Butanol(l)	−342.6		214.9	196.9
C ₄ H ₁₀ O	2-Butanol(g)	−292.8		359.5	112.7
C ₅ H ₈	1-Pentyne(g)	144	210	330	105
C ₅ H ₈	2-Pentyne(g)	129	194	332	99
C ₅ H ₈	Cyclopentene(l)	4.3		201.2	122.4
C ₅ H ₈	Cyclopentene(g)	34	111	290	75
C ₅ H ₁₀	1-Pentene(l)	−46.9		262.6	154
C ₅ H ₁₀	1-Pentene(g)	−21.1	79	346	110
C ₅ H ₁₀	2-Methyl-1-butene(g)	−35.2	66	340	112
C ₅ H ₁₀	2-Methyl-1-butene(l)	−61.1		254	157.2
C ₅ H ₁₀	Cyclopentane(l)	−105.1		204.5	128.8
C ₅ H ₁₀	Cyclopentane(g)	−76.4	39	293	83
C ₅ H ₁₀ O ₂	Pentanoic acid(l)	−559.4		259.8	210.3
C ₅ H ₁₀ O ₂	Pentanoic acid(g)	−491.9			
C ₅ H ₁₂	2,2-Dimethylpropane(g)	−166	−15	306	122
C ₅ H ₁₂	2-Methylbutane(g)	−155	−15	344	119
C ₅ H ₁₂	Pentane(l)	−173.5			167.2
C ₅ H ₁₂	Pentane(g)	−146.9	−8	349	120
C ₅ H ₁₂ O	1-Pentanol(l)	−351.6			208.1
C ₅ H ₁₂ O	1-Pentanol(g)	−294.6			
C ₅ H ₁₂ O	2-Pentanol(l)	−365.2			
C ₅ H ₁₂ O	2-Pentanol(g)	−311			
C ₅ H ₁₂ O	3-Pentanol(l)	−368.9			239.7
C ₅ H ₁₂ O	3-Pentanol(g)	−314.9			
C ₅ H ₁₂ O	Methyl tert-butyl ether(l)	−313.6		265.3	187.5
C ₅ H ₁₂ O	Methyl tert-butyl ether(g)	−283.7			
C ₆ H ₆	Benzene(l)	49.1	124.5	173.4	136
C ₆ H ₆	Benzene(g)	82.9	129.7	269.2	82.4

Formula:	Name:	$\Delta_f H^\ominus$ [kJ/mol]	$\Delta_f G^\ominus$ [kJ/mol]	S^\ominus [J/(mol K)]	C_P [J/(mol K)]
C ₆ H ₇ N	Aniline(l)				191.9
C ₆ H ₇ N	Aniline(g)	87.5	-7	317.9	107.9
C ₆ H ₁₀	1-Hexyne(g)	124	219	369	128
C ₆ H ₁₀	Cyclohexene(l)	-28.5		214.6	148.3
C ₆ H ₁₀	Cyclohexene(g)	-5	107	311	105
C ₆ H ₁₂	1-Hexene(l)	-74.2		295.2	183.3
C ₆ H ₁₂	1-Hexene(g)	-43.5	87	385	132
C ₆ H ₁₂	2-Methyl-1-pentene(g)	-59.4			
C ₆ H ₁₂	2-Methyl-1-pentene(l)	-90			
C ₆ H ₁₂	Cyclohexane(l)	-156.4			154.9
C ₆ H ₁₂	Cyclohexane(g)	-123.4	32	298	106
C ₆ H ₁₂	Methylcyclopentane(g)	-106.2			
C ₆ H ₁₂	Methylcyclopentane(l)	-137.9			
C ₆ H ₁₂ O ₂	Hexanoic acid(l)	-583.8			
C ₆ H ₁₂ O ₂	Hexanoic acid(g)	-511.9			
C ₆ H ₁₄	2,2-Dimethylbutane(g)	-185.9	-10	358	142
C ₆ H ₁₄	2,2-Dimethylbutane(l)	-213.8		272.5	191.9
C ₆ H ₁₄	2-Methylpentane(g)	-174.6	-5	381	144
C ₆ H ₁₄	2-Methylpentane(l)	-204.6		290.6	193.7
C ₆ H ₁₄	3-Methylpentane(g)	-171.9	-2	380	143
C ₆ H ₁₄	3-Methylpentane(l)	-202.4		292.5	190.7
C ₆ H ₁₄	Hexane(l)	-198.7			195.6
C ₆ H ₁₄	Hexane(g)	-166.9	-0.3	388	143
C ₆ H ₁₄ O	1-Hexanol(l)	-377.5		287.4	240.4
C ₆ H ₁₄ O	1-Hexanol(g)	315.9			
C ₆ H ₁₄ O	2-Hexanol(l)	-392			
C ₆ H ₁₄ O	2-Hexanol(g)	-333.5			
C ₇ H ₆ O	Phenol(s)	-165.1		144	127.4
C ₇ H ₆ O	Phenol(g)	-96.4	-33	316	104
C ₇ H ₈	Methylbenzene(l)	12.0		220	156
C ₇ H ₈	Methylbenzene(g)	50.0	122	321	104
C ₇ H ₁₄	1-Heptene(l)	-97.9		327.6	211.8
C ₇ H ₁₄	1-Heptene(g)	-62.3	96	424	15

Formula:	Name:	$\Delta_f H^\ominus$ [kJ/mol]	$\Delta_f G^\ominus$ [kJ/mol]	S^\ominus [J/(mol K)]	C_P [J/(mol K)]
C ₇ H ₁₄	Cycloheptane(l)	−156.6			
C ₇ H ₁₄	Cycloheptane(g)	−118.1			
C ₇ H ₁₄	Ethylcyclopentane(l)	−163.4		279.9	
C ₇ H ₁₄	Ethylcyclopentane(g)	−126.9			
C ₇ H ₁₄	Methylcyclohexane(g)	−154.7			
C ₇ H ₁₄	Methylcyclohexane(l)	−190.1			184.8
C ₇ H ₁₄ O ₂	Heptanoic acid(l)	−610.2			265.4
C ₇ H ₁₄ O ₂	Heptanoic acid(g)	−536.2			
C ₇ H ₁₆	2,2-Dimethylpentane(g)	−205.7			
C ₇ H ₁₆	2,2-Dimethylpentane(l)	−238.3		300.3	221.1
C ₇ H ₁₆	2-Methylhexane(g)	−194.5			
C ₇ H ₁₆	2-Methylhexane(l)	−229.5		323.3	222.9
C ₇ H ₁₆	3-Methylhexane(g)	−191.3			
C ₇ H ₁₆	3-Methylhexane(l)	−226.4			
C ₇ H ₁₆	Heptane(l)	−224.2			224.7
C ₇ H ₁₆	Heptane(g)	−187.6	8	428	166
C ₇ H ₁₆ O	1-Heptanol(l)	−403.3			272.1
C ₇ H ₁₆ O	1-Heptanol(g)	−336.5			
C ₈ H ₁₀	Ethylbenzene(l)	−12.3			183.2
C ₈ H ₁₀	Ethylbenzene(g)	29.9	131	361	128
C ₈ H ₁₆	1-Octene(l)	−124.5			241
C ₈ H ₁₆	1-Octene(g)	−81.3	104	463	178
C ₈ H ₁₆	Cyclooctane(l)	−167.7			
C ₈ H ₁₆	Cyclooctane(g)	−124.4			
C ₈ H ₁₆	Ethylcyclohexane(l)	−212.1		280.9	211.8
C ₈ H ₁₆	Ethylcyclohexane(g)	−171.5			
C ₈ H ₁₆ O ₂	Octanoic acid(l)	−636			297.9
C ₈ H ₁₆ O ₂	Octanoic acid(g)	−554.3			
C ₈ H ₁₈	2-Methylheptane(g)	−215.3			
C ₈ H ₁₈	2-Methylheptane(l)	−255		356.4	252
C ₈ H ₁₈	3-Methylheptane(g)	−212.5			
C ₈ H ₁₈	3-Methylheptane(l)	−252.3		362.6	250.2

Formula:	Name:	$\Delta_f H^\ominus$ [kJ/mol]	$\Delta_f G^\ominus$ [kJ/mol]	S^\ominus [J/(mol K)]	C_P [J/(mol K)]
C ₈ H ₁₈	Octane(l)	-250.1			254.6
C ₈ H ₁₈	Octane(g)	-208.5	16	467	189
C ₈ H ₁₈ O	1-Octanol(l)	-426.5			305.2
C ₈ H ₁₈ O	1-Octanol(g)	-355.6			
C ₈ H ₁₉	2,2-Dimethylhexane(g)	-224.5			
C ₈ H ₁₉	2,2-Dimethylhexane(l)	-261.9			
C ₉ H ₁₈	Propylcyclohexane(g)	-192		420	242
C ₉ H ₁₂	Propylbenzene(g)	8	137	401	154
C ₉ H ₁₆	1-Nonyne(l)	16.3			
C ₉ H ₁₆	1-Nonyne(g)	62.3			
C ₉ H ₁₈ O ₂	Nonanoic acid(l)	-659.7			362.4
C ₉ H ₁₈ O ₂	Nonanoic acid(g)	-577.3			
C ₉ H ₂₀	2,2-Dimethylheptane(g)	-246			
C ₉ H ₂₀	2,2-Dimethylheptane(l)	-288.1			
C ₉ H ₂₀	Nonane(l)	-274.7			284.4
C ₉ H ₂₀	Nonane(g)	-228.2	25	506	212
C ₉ H ₂₀ O	1-Nonanol(l)	-453.4			
C ₉ H ₂₀ O	1-Nonanol(g)	-376.5			
C ₁₀ H ₈	Naphthalene(g)	151	224	336	
C ₁₀ H ₁₄	Butylbenzene(l)	-63.2		321.2	243.4
C ₁₀ H ₁₄	Butylbenzene(g)	-11.8			
C ₁₀ H ₂₀	1-Decene(l)	-173.8		425	300.8
C ₁₀ H ₂₀	1-Decene(g)	-123.3			301
C ₁₀ H ₂₀	Butylcyclohexane(l)	-263.1		345	271
C ₁₀ H ₂₀	Butylcyclohexane(g)	-213.7			
C ₁₀ H ₂₀ O ₂	Decanoic acid(s)	-713.7			
C ₁₀ H ₂₀ O ₂	Decanoic acid(l)	-684.3			
C ₁₀ H ₂₀ O ₂	Decanoic acid(g)	-594.9			
C ₁₀ H ₂₂	2-Methylnonane(g)	-260.2			
C ₁₀ H ₂₂	2-Methylnonane(l)	-309.8		420.1	313.3
C ₁₀ H ₂₂	Decane(l)	-300.9			314.4

Formula:	Name:	$\Delta_f H^\ominus$ [kJ/mol]	$\Delta_f G^\ominus$ [kJ/mol]	S^\ominus [J/(mol K)]	C_P [J/(mol K)]
C ₁₀ H ₂₂	Decane(g)	-249.5	33	545	235
C ₁₀ H ₂₂ O	1-Decanol(l)	-478.1			370.6
C ₁₀ H ₂₂ O	1-Decanol(g)	-396.6			
C ₁₁ H ₁₀	1-Methylnaphthalene(l)	56.3		254.8	224.4
C ₁₁ H ₁₀	2-Methylnaphthalene(s)	44.9		220	196
C ₁₁ H ₁₀	2-Methylnaphthalene(g)	106.7			
C ₁₁ H ₂₂	1-Undecene(g)				344.9
C ₁₁ H ₂₄	Undecane(l)	-327.2			344.9
C ₁₁ H ₂₄	Undecane(g)	-270.8	42	584	257
C ₁₁ H ₂₄ O	1-Undecanol(l)	-504.8			
C ₁₂ H ₂₄	1-Dodecene(l)	-226.2		484.8	360.7
C ₁₂ H ₂₄	1-Dodecene(g)	-165.4			
C ₁₂ H ₂₄ O ₂	Dodecanoic acid(s)	-774.6			404.3
C ₁₂ H ₂₄ O ₂	Dodecanoic acid(l)	-737.9			
C ₁₂ H ₂₄ O ₂	Dodecanoic acid(g)	642			
C ₁₂ H ₂₆	Dodecane(l)	-350.9			375.8
C ₁₂ H ₂₆	Dodecane(g)	-289.4	50	623	280
C ₁₂ H ₂₆ O	1-Dodecanol(l)	-528.5			438.1
C ₁₂ H ₂₆ O	1-Dodecanol(g)	-436.6			
C ₁₄ H ₁₀	Anthracene(g)	231			
C ₁₄ H ₁₀	Phenantrene(g)	207			
C ₁₅ H ₃₀	Decylcyclopentane(l)	-367.3			
C ₁₆ H ₂₆	Decylbenzene(l)	-218.3			
C ₁₆ H ₂₆	Decylbenzene(g)	-138.6			
C ₁₆ H ₃₂	1-Hexadecene(l)	-328.7		587.9	488.9
C ₁₆ H ₃₂	1-Hexadecene(g)	-248.4			
C ₁₆ H ₃₂ O ₂	Hexadecanoic acid(s)	-891.5		452.4	460.7
C ₁₆ H ₃₂ O ₂	Hexadecanoic acid(l)	-838.1			

Formula:	Name:	$\Delta_f H^\ominus$ [kJ/mol]	$\Delta_f G^\ominus$ [kJ/mol]	S^\ominus [J/(mol K)]	C_P [J/(mol K)]
C ₁₆ H ₃₂ O ₂	Hexadecanoic acid(g)	−737.1			
C ₁₆ H ₃₄	N-hexadecane(l)	−456.1			501.6
C ₁₆ H ₃₄	N-hexadecane(g)	−374.8			
C ₁₈ H ₁₂	Chrysene(s)	145.3			
C ₁₈ H ₁₂	Chrysene(g)	269.8			

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