

Tabla A3-1 Datos Termodinámicos de Elementos y Compuestos Inorgánicos Seleccionados a 298.15 K y 1 atm*

Sustancia	Estado	ΔH_f° (kJ mol ⁻¹)	ΔG_f° (kJ mol ⁻¹)	S° (J K ⁻¹ mol ⁻¹)	C_p° (J K ⁻¹ mol ⁻¹)
Ag	s	0	0	42.71	25.49
Ag ⁺	ac	105.90	77.11	73.93	37.66
AgCl	s	-127.04	-109.72	96.11	50.79
AgBr	s	-99.50	-95.94	107.11	52.38
AgI	s	-62.38	-66.32	114.22	54.43
AgNO ₃	s	-123.14	-32.18	140.92	93.05
Al	s	0	0	28.32	24.34
Al ³⁺	ac	-524.67	-481.16	-313.38	
Al ₂ O ₃	s	-1669.79	-1576.41	50.99	78.99
Ar	g	0	0	154.74	20.79
As	s	0	0	35.15	24.98
AsO ₄ ³⁻	ac	-870.27	-635.97	-144.77	
AsH ₃	g	171.54			
H ₃ AsO ₄	s	-900.40			
Au	s	0	0	47.70	25.23
Au ₂ O ₃	s	80.75	163.18	125.52	
AuCl	s	-35.15			
AuCl ₃	s	-118.41			
B	s	0	0	6.53	11.97
B ₂ O ₃	s	1263.57	1184.07	54.02	62.26
H ₃ BO ₃	s	-1087.84	-963.16	89.58	82.05
	ac	-1067.76	-963.32	159.83	
Ba	s	0	0	66.94	26.36
Ba ²⁺	ac	-538.36	-560.66	12.55	
BaO	s	-558.15	-528.44	70.29	47.45
BaCl ₂	s	-860.06	-810.86	125.52	75.31
BaSO ₄	s	-1464.4	-1353.11	132.21	101.75
BaCO ₃	s	-1218.80	-1138.88	112.13	85.35
Be	s	0	0	9.54	17.82
BeO	s	-610.86	-581.58	14.10	25.40
Br ₂	l	0	0	152.30	
Br ⁻	ac	-120.92	102.82	80.71	-128.45
HBr	g	-36.23	-53.22	198.48	29.12
C	s	0	0	5.69	8.64
	(grafito)				
	s	1.90	2.87	2.44	6.06
	(diamante)				
CO	g	-110.52	-137.27	197.91	29.14
CO ₂	g	-393.51	-394.38	213.64	37.13
	ac	-412.92	-386.23	121.34	
CO ₃ ²⁻	ac	-676.26	-528.10	-53.14	
HCO ₃ ⁻	ac	-691.11	-587.06	94.98	
H ₂ CO ₃	ac	-699.65	-623.17	187.44	
CS ₂	g	115.27	65.06	237.82	45.65
	l	87.86	63.60	151.04	75.73
HCN	ac	105.44	112.13	128.87	

* Los datos se tomaron de Selected Values of Chemical Thermodynamics Properties, de F. D. Rossini y colaboradores, publicados por la National Bureau of Standards (NBS Circular 500), 1952 y NBS Technical Notes 270-3 (1969), D. D. Wagman y Cols. (Eds.). Todos los datos se refieren a 1 mol de material en el estado indicado a 1 atm de presión y 298.15 K. Los valores de los iones en solución acuosa (1 m), tales como el Li⁺ (ac), se basan en la convención de que todas las propiedades correspondientes al H⁺ (ac) son iguales a cero. Así, al sumar los valores de las combinaciones neutras de iones con carga opuesta, se obtienen los valores correctos de las sales en solución acuosa.

Tabla A3-1 (continuación).

Sustancia	Estado	$\Delta\bar{H}_f^\circ$ (kJ mol ⁻¹)	$\Delta\bar{G}_f^\circ$ (kJ mol ⁻¹)	\bar{S}° (J K ⁻¹ mol ⁻¹)	\bar{C}_p° (J K ⁻¹ mol ⁻¹)
CN ⁻	ac	151.0	165.69	117.99	
CNO ⁻	ac	-140.16	-98.74	130.12	
NH ₄ HCO ₃	s	-852.28			
CO(NH ₂) ₂	s	-333.19	-197.15	104.6	93.14
	ac	-319.24	-203.84	173.85	
Ca	s	0	0	41.63	26.28
Ca ²⁺	ac	-542.96	-553.04	-55.23	
CaO	s	-635.55	-604.17	39.75	42.80
Ca(OH) ₂	s	-986.59	-896.76	76.15	84.52
CaF ₂	s	-1214.62	-1161.90	68.87	67.03
CaCl ₂	s	-794.96	-750.19	113.81	72.63
CaSO ₄	s	-1432.69	-1320.30	106.69	99.58
CaCO ₃	s	-1206.88	-1128.76	92.89	81.88
Cd	s	0	0	51.46	25.90
Cd ²⁺	ac	-72.38	-77.74	-61.09	
CdO	s	-254.64	-225.06	54.81	43.43
CdCl ₂	s	-389.11	-342.59	118.41	
CdSO ₄	s	-926.17	-820.2	137.24	
Cl ₂	g	0	0	222.95	33.93
HCl	g	-92.31	-95.27	185.9	29.12
Co	s	0	0	28.45	25.56
Co ²⁺	ac	-67.36	-51.46	155.23	
CoO	s	-239.32	-213.38	43.93	
Cr	s	0	0	23.77	23.35
Cr ²⁺	ac	-138.91			
Cr ₂ O ₃	s	-1128.43	-1046.84	81.17	118.74
CrO ₄ ²⁻	ac	-863.16	-706.26	38.49	
Cr ₂ O ₇ ²⁻	ac	-1460.63	-1257.29	213.80	
Cs	s	0	0	82.84	31.05
Cs ⁺	ac	-247.69	-282.04	133.05	
Cu	s	0	0	33.31	24.47
Cu ⁺	ac	51.88	50.21	-26.36	
Cu ²⁺	ac	64.39	64.98	98.74	
CuO	s	-155.23	-127.19	43.51	44.35
Cu ₂ O	s	-166.69	-146.36	100.83	69.87
CuCl	s	-134.73	-118.83	91.63	
CuCl ₂	s	-205.85			
CuS	s	-48.53	-48.95	66.53	47.82
CuSO ₄	s	-769.86	-661.91	113.39	100.83
F ₂	g	0	0	203.34	31.46
F ⁻	ac	-329.11	-276.48	-9.62	-123.43
HF	g	-268.61	-270.71	173.51	29.08
Fe	s	0	0	27.15	25.23
Fe ²⁺	ac	-87.86	-84.94	-113.39	
Fe ³⁺	ac	-47.70	-10.54	-293.30	
Fe ₂ O ₃	s	-822.16	-740.99	89.96	104.6
Fe(OH) ₂	s	-568.19	-483.55	79.50	
Fe(OH) ₃	s	-824.25			
H	g	-218.0	203.24	114.61	20.79
H ₂	g	0	0	130.59	28.84
H ⁺	aq	0	0	0	0

Tabla A3-1 (continuación).

Sustancia	Estado	ΔH_f° (kJ mol ⁻¹)	ΔG_f° (kJ mol ⁻¹)	S° (J K ⁻¹ mol ⁻¹)	C_p° (J K ⁻¹ mol ⁻¹)
OH ⁻	ac	-229.94	-157.30	-10.54	-133.89
H ₂ O	g	-241.83	-228.60	188.72	33.58
H ₂ O	l	-285.84	-237.19	69.94	75.30
H ₂ O ₂	l	-187.61	-118.11		
H ₂ O ₂	ac	-191.13			
He	g	0	0	126.05	20.79
Hg	l	0	0	77.40	27.82
Hg ²⁺	ac		-164.38		
HgO	s (rojo)	-90.71	-58.53	71.97	45.73
HgCl ₂	s	-230.12			
Hg ₂ Cl ₂	s	-264.93	-210.66	196.22	101.67
HgS	s (rojo)	-58.16	-48.83	77.82	
HgSO ₄	s	-704.17			
Hg ₂ SO ₄	s	-741.99	-623.92	200.75	132.01
I ₂	s	0	0	116.73	54.98
I ⁻	ac	55.94	51.67	109.37	-129.70
HI	g	25.94	1.30	206.33	29.16
K	s	0	0	63.60	29.16
K ⁺	ac	-251.21	-282.28	102.5	
K ₂ O	s	-361.50			
KOH	s	-425.85			
KCl	s	-435.87	-408.33	82.68	51.51
KClO ₃	s	-391.20	-289.91	142.97	100.25
KClO ₄	s	-433.46	-304.18	151.04	110.17
KBr	s	-392.17	-379.20	96.44	53.64
KI	s	-327.65	-322.29	104.35	55.06
KNO ₃	s	-492.71	-393.13	132.93	96.27
K ₂ CO ₃	s	-1146.12			
Kr	g	0	0	163.97	20.79
Li	s	0	0	28.03	23.64
Li ⁺	ac	-278.46	-293.80	14.23	
Li ₂ O	s	-595.80			
LiOH	s	-487.23	-443.92	50.21	
Mg	s	0	0	32.51	23.89
Mg ²⁺	ac	-461.96	-456.01	-117.99	
MgO	s	-601.83	-569.57	26.78	37.41
Mg(OH) ₂	s	-924.66	-833.75	63.14	77.03
MgCl ₂	s	-641.83	-592.33	89.54	71.30
MgSO ₄	s	-1278.21	-1173.61	91.63	96.27
MgCO ₃	s	-1112.94	-1029.26	65.69	75.52
Mn	s	0	0	31.76	26.32
Mn ²⁺	ac	-218.82	-223.43	-83.68	
Mn ³⁺	ac	-100.42			
MnO ₂	s	-520.91	-466.10	53.14	54.02
N ₂	g	0	0	191.49	29.12
N ₃ ⁻	ac	245.18			
NH ₃	g	-46.19	-16.64	192.51	35.66
NH ₄ ⁺	ac	-132.80	-79.50	112.84	
NH ₄ Cl	s	-315.39	-203.89	94.56	84.10
NH ₄ OH	ac	-366.1	-263.76	181.17	-68.62
N ₂ H ₄	l	50.42			
NO	g	90.37	86.69	210.62	29.86

Tabla A3-1 (continuación).

Sustancia	Estado	$\Delta \bar{H}_f^\circ$ (kJ mol ⁻¹)	$\Delta \bar{G}_f^\circ$ (kJ mol ⁻¹)	\bar{S}° (J K ⁻¹ mol ⁻¹)	\bar{C}_p° (J K ⁻¹ mol ⁻¹)
NO ₂	g	33.85	51.84	240.46	37.91
N ₂ O ₄	g	9.66	98.29	304.30	79.08
N ₂ O	g	81.56	103.60	219.99	38.70
HNO ₂	ac	-118.83	-53.64		
HNO ₃	l	-173.22	-79.9	155.60	109.87
NO ₃	ac	-206.57	-110.50	146.44	
Na	s	0	0	51.05	28.41
Na ⁺	ac	-239.66	-261.87	60.25	
Na ₂ O	s	-415.89	-376.56	72.80	68.20
NaCl	s	-411.00	-384.03	72.38	49.71
NaBr	s	-359.95			52.3
NaI	s	-288.03			54.39
Na ₂ SO ₄	s	-1384.49	-1266.83	149.49	127.61
NaNO ₃	s	-466.68	-365.89	116.32	93.05
Na ₂ CO ₃	s	-1130.94	-1047.67	135.98	110.50
NaHCO ₃	s	-947.68	-851.86	102.09	87.61
Ne	g	0	0	146.22	20.79
Ni	s	0	0	30.13	25.98
Ni ²⁺	ac	-64.02	-46.44	159.41	
NiO	s	-244.35	-216.31	38.58	44.35
Ni(OH) ₂	s	-538.06	-453.13	79.50	
O	g	249.4	230.10	160.95	21.91
O ₂	g	0	0	205.03	29.36
O ₃	ac	-12.09	16.32	110.88	167.4
	g	142.26	163.43	237.65	38.16
P	s	0	0	44.00	23.22
	(blanco)				
	s	-18.40	13.82	29.31	
	(rojo)				
PO ₄ ³⁻	ac	-1284.07	-1025.59	-217.57	
P ₂ O ₇ ⁴⁻	ac	-2275.68			
P ₄ O ₁₀	s	-3012.48			
PH ₃	g	9.25	18.24	210.04	
HPO ₄ ²⁻	ac	-1298.71	-1094.12	-35.98	
H ₂ PO ₄ ⁻	ac	-1302.48	-1135.12	89.12	
H ₃ PO ₄	s	-1281.14			
H ₄ P ₂ O ₇	s	-2250.99			
Pb	s	0	0	64.89	26.82
Pb ²⁺	aq	1.63	24.31	21.34	
PbO	s	-217.86	-188.49	69.45	48.53
	(amarillo)				
PbO ₂	s	-276.65	-218.99	76.57	64.43
PbCl ₂	s	-359.20	-313.97	136.40	76.99
PbS	s	-94.31	-92.68	91.21	49.50
PbSO ₄	s	-918.40	-811.24	147.28	104.18
Pt	s	0	0	41.84	26.57
PtCl ₄ ²⁻	aq	-516.31	-384.51	175.73	
Rb	s	0	0	69.45	30.42
Rb ⁺	aq	-246.44	-282.21	124.27	
S	s	0	0	31.88	22.59
	(rómbo)				

Tabla A3-1 (continuación).

Sustancia	Estado	$\overline{\Delta H_f^\circ}$ (kJ mol ⁻¹)	$\overline{\Delta G_f^\circ}$ (kJ mol ⁻¹)	$\overline{S^\circ}$ (J K ⁻¹ mol ⁻¹)	$\overline{C_p^\circ}$ (J K ⁻¹ mol ⁻¹)
	s	0.30	0.10	32.55	23.64
	(monoclínico)				
SO ₂	g	-296.06	-300.37	248.52	39.79
SO ₃	g	-395.18	-370.37	256.22	50.63
SO ₃ ²⁻	ac	-624.25	-497.06	43.51	
SO ₄ ²⁻	ac	-907.51	-741.99	17.15	
H ₂ S	g	-20.15	-33.02	205.64	33.97
HSO ₃ ⁻	ac	-627.98	-527.31	132.38	
HSO ₄ ⁻	ac	-885.75	-752.87	126.86	
H ₂ SO ₄	l	-811.32			
SF ₆	g	-1096.21			
Se	s	0	0	42.44	25.36
SeO ₂	s	-225.35			
H ₂ Se	g	29.71	15.90	218.91	34.73
H ₂ SeO ₄	s	-530.11			
Si	s	0	0	18.70	19.87
SiO ₂	s	-859.30	-805.00	41.84	44.43
	(cuarzo)				
Sr	s	0	0	54.39	25.10
Sr ²⁺	ac	-545.51	-557.31	39.33	
SrCl ₂	s	-828.43	-781.15	117.15	79.08
SrSO ₄	s	-1444.74	-1334.28	121.75	
SrCO ₃	s	-1218.38	-1137.63	97.07	81.42
W	s	0	0	33.47	24.98
WO ₃	s	-840.31	-763.45	83.26	81.50
WO ₄ ⁻	ac	-1115.45			
Xe	g	0	0	169.58	20.79
Zn	s	0	0	41.63	25.06
Zn ²⁺	ac	-152.42	-147.21	106.48	
ZnO	s	-347.98	-318.19	43.93	40.25
ZnCl ₂	s	-415.89	-369.26	108.37	76.57
ZnS	s	-202.92	-198.32	57.74	45.19
ZnSO ₄	s	-978.55	-871.57	124.68	117.15

Tabla A3-2 Datos Termodinámicos de Moléculas Orgánicas y Biológicas a 298.15 K y 1 at m^o.

Compuesto	Fórmula	Estado	$\Delta \overline{H}_f^\circ$ (kJ mol ⁻¹)	$\Delta \overline{G}_f^\circ$ (kJ mol ⁻¹)	\overline{S}° (J K ⁻¹ mol ⁻¹)	\overline{C}_p° (J K ⁻¹ mol ⁻¹)
Acido acético	CH ₃ COOH	l	-484.21	-389.45	159.83	
		ac	-485.26	-404.09	205.43	
		eq am	-485.60	-417.52	249.37	
Acetato	CH ₃ COO ⁻	ac	-485.60	-376.89	112.97	
Acetaldehído	CH ₃ CHO	g	-246.81	-139.08	264.22	56.07
Acetona	CH ₃ COCH ₃	l	-246.81	-153.55	198.74	126.78
Acetileno	C ₂ H ₂	g	226.73	209.2	200.83	43.93
Adenina	C ₅ H ₅ N ₅	s	97.07	-300.41	151.04	143.09
DL-Alanina	C ₃ H ₇ O ₂ N	s	-563.59	-371.96	132.21	121.75
L-Alanina	C ₃ H ₇ O ₂ N	s	-562.75	-370.20	129.20	122.26
		eq am	-554.80	-371.16	158.99	
L-Alanina, ion	C ₃ H ₈ O ₂ N ⁻	ac	-557.94	-384.55	192.05	288.70
L-Alanina, ion dipolar	C ₃ H ₇ O ₂ ²⁻	ac	-554.80	-371.16	158.99	141.00
L-Alaninato, ion	C ₃ H ₆ O ₂ N ⁻	ac	-509.61	-314.85	121.75	71.55
L-Arginina	C ₆ H ₁₄ O ₂ N ₄	s	-621.74	-656.89	250.62	233.47
L-Arginina, ion dipolar	C ₆ H ₁₄ O ₂ N ₄ ⁻	ac	-615.47			
Acido DL-aspartico	C ₄ H ₇ O ₄ N	s	-976.96	-729.27	154.39	
Acido L-aspartico	C ₄ H ₇ O ₄ N	s	-972.53	-729.36	170.12	155.27
		eq am	-943.41	-736.51	291.63	
Acido L-aspartico, ion	C ₄ H ₈ O ₄ N ⁻	ac	-955.17	-733.87	229.28	
Acido L-aspartico, ion dipolar	C ₄ H ₇ O ₄ N ²⁻	ac	-947.43	-718.06	216.31	
Acido L-aspartico, ion dipolar	C ₄ H ₆ O ₄ N ²⁻	ac	-943.41	-695.88	155.65	
L-Aspartato, ion	C ₄ H ₅ O ₄ N ²⁻	ac	-905.84	-638.69	89.96	
L-Asparagina	C ₄ H ₈ O ₃ N ₂	s	-790.36	-530.95	174.47	160.67
L-Asparagina, ion dipolar	C ₄ H ₈ O ₃ N ₂ ⁻	ac	-766.09	-525.93	238.91	
L-Asparagina, monohidrato	C ₄ H ₁₀ O ₄ N ₂	s	-1085.75	-767.35	209.62	207.95
Benceno	C ₆ H ₆	l	49.04	172.80	124.52	
Acido butírico	C ₄ H ₈ O ₂	l	-535.13	-379.07	226.35	179.49
		ac	-532.62	-399.57	303.76	
		eq am	-535.55	-412.54	320.91	
Butirato, ion	C ₄ H ₇ O ₂ ⁻	ac	-535.55	-372.04	201.67	
Acido cítrico	C ₆ H ₈ O ₇	s	-1543.90			
		eq am	-1515.78	-1288.63	512.54	
Dihidrogenocitrato, ion	C ₆ H ₇ O ₇ ⁻	ac	-1520.88	-1226.33	286.19	187.86
Hydrogenocitrato, ion	C ₆ H ₆ O ₇ ²⁻	ac	-1518.46	-1199.18	203.34	0.84
Citrato, ion	C ₆ H ₅ O ₇ ³⁻	ac	-1515.11	-1162.69	92.05	-254.81
Acido cítrico, nonohidrato	C ₆ H ₁₀ O ₈	s	-1838.45	-1473.56	283.47	268.15
Creatinina	C ₄ H ₇ ON ₃	s	-237.65	-28.45	167.36	138.91
Creatinina, ion	C ₄ H ₈ ON ₃ ⁻	ac		4.14		
Creatina	C ₄ H ₉ O ₂ N ₃	s	-536.47	-264.01	189.54	171.96
		ac		-259.20		
		eq am		-259.20		
Creatina, ion	C ₄ H ₁₀ O ₂ N ₃ ⁺	ac		-274.39		
Creatina, ion	C ₄ H ₈ O ₂ N ₃ ⁻	ac		-177.82		
Creatina, monohidrato	C ₄ H ₁₁ O ₃ N ₃	s	-833.03	-504.59	234.30	213.38

* Los datos se tomaron del Apéndice de la obra de R. C. Wilhoit, "Thermodynamic Properties of Biochemical Substances", Cap. 2, de *Biochemical Microcalorimetry*, H. D. Brown, Ed., Academic Press, Inc., New York, 1969. El símbolo "eq am" se refiere a una mezcla en equilibrio de la especie en una solución acuosa amortiguada a pH 7. Las concentraciones de las soluciones acuosas son 1 m.

Tabla A3-2 (continuación).

Compuesto	Fórmula	Estado	ΔH_f° (kJ mol ⁻¹)	ΔG_f° (kJ mol ⁻¹)	\bar{S}° (J K ⁻¹ mol ⁻¹)	\bar{C}_p° (J K ⁻¹ mol ⁻¹)
L-Cisteína	C ₃ H ₇ O ₂ NS	s	-532.62	-342.67	169.87	173.22
		eq am		338.95		
L-Cisteína, ion	C ₃ H ₈ O ₂ NS ⁻	ac	-349.36			
L-Cisteína, ion dipolar	C ₃ H ₇ O ₂ NS ⁻	ac		-338.82		
L-Hidrogenocistei- nato, ion	C ₃ H ₆ O ₂ NS	ac		-290.99		
L-Cisteinato, ion	C ₃ H ₅ O ₂ NS ²⁻	ac		-229.58		
L-Cistina	C ₆ H ₁₂ O ₄ N ₂ S ₂	s	-1044.33	-685.76	280.58	261.92
		eq am		-668.19		
L-Cistina, ion	C ₆ H ₁₄ O ₄ N ₂ S ₂ ²⁻	ac		-684.50		
L-Cistina, ion dipolar	C ₆ H ₁₃ O ₄ N ₂ S ₂ ⁻	ac		-678.23		
L-Cistina, ion dipolar	C ₆ H ₁₂ O ₄ N ₂ S ₂ ²⁻	ac		-666.51		
L-Cistinato, ion	C ₆ H ₁₀ O ₄ N ₂ S ₂ ⁻	ac		-562.33		
Etanol	C ₂ H ₅ OH	l	-276.98	-174.18	161.04	111.96
Acetato de etilo	C ₄ H ₈ O ₂	l	-481.99	-337.65	262.76	105.44
Etano	C ₂ H ₆	g	-84.68	-32.89	229.49	52.66
Etileno	C ₂ H ₄	g	52.3	68.12	219.45	43.56
Acido fórmico	HCOOH	l	-409.20	-346.02	128.95	99.04
Formato, ion	HCOO ⁻	ac	-410.03	-334.72	91.63	
Acido fumárico	C ₄ H ₄ O ₄	s	-810.65	-653.25	166.11	142.26
		ac	-774.88	-645.80	261.08	
		eq am	-777.39	-684.38	381.99	
Hidrogenofuma- rato, ion	C ₄ H ₃ O ₄	ac	-774.46	-628.14	203.34	
Fumarato, ion	C ₄ H ₂ O ₄ ²⁻	ac	-777.39	-601.87	105.44	
α-D-Glucosa	C ₆ H ₁₂ O ₆	s	-1274.45	-910.56	212.13	218.87
		ac	-1263.06	-914.54	264.01	
β-D-Glucosa	C ₆ H ₁₂ O ₆	s	-1268.05	-908.89	228.03	
		ac	-1264.24	-915.79	264.01	
α,β-D-Glucosa	C ₆ H ₁₂ O ₆	ac	-1263.78	-916.97	269.45	305.43
α-D-Glucosa, monohidrato	C ₆ H ₁₄ O ₇	s	-1571.09	-1149.55	252.30	
Acido glucosa l-fosfórico	C ₆ H ₁₃ O ₉ P	ac		-1789.50		
		eq am		-1828.83		
Glucosa l-hidro- genofosfato, ion	C ₃ H ₁₂ O ₉ P ⁻	ac		-1783.22		
Glucosa l-fosfato, ion	C ₃ H ₁₂ O ₉ P ²⁻	ac		-1746.11		
Acido Glucosa 6-fosfórico	C ₆ H ₁₃ O ₉ P	ac		-1797.45		
Glucosa 6-hidrogenofos- fato, ion	C ₆ H ₁₂ O ₉ P ⁻	ac		-1789.08		
Glucosa 6- fosfato, ion	C ₆ H ₁₁ O ₉ P ²⁻	ac		-1753.51		
Glicerol	C ₃ H ₈ O ₃	l	-670.70	-479.49	204.60	216.73
Acido L-glutámico	C ₅ H ₉ O ₄ N	s	-1009.18	-730.95	188.20	175.23
		eq am	-981.98	-721.87	248.95	
Acido L-glutámi- co, ion	C ₅ H ₁₀ O ₄ N ⁺	ac	-981.57	-734.63	293.72	
Acido L-glutámi- co ion dipolar	C ₅ H ₉ O ₄ N ⁻	ac	-981.99	-721.87	248.95	
Acido L-glutámi- co, ion dipolar	C ₅ H ₈ O ₄ N ²⁻	ac	-979.89	-697.47	174.05	

Tabla A3-2 (continuación).

Compuesto	Fórmula	Estado	ΔH_f° (kJ mol ⁻¹)	ΔG_f° (kJ mol ⁻¹)	S° (J K ⁻¹ mol ⁻¹)	C_p° (J K ⁻¹ mol ⁻¹)
L-Glutamato, ion	C ₅ H ₇ O ₄ N ²⁻	ac	-939.73	-643.50	127.61	
L-Glutamina	C ₅ H ₁₀ O ₃ N ₂	s	-825.92	-532.21	195.10	183.80
		eq am	-805.00	-528.02	251.04	
L-Glutamina, ion dipolar	C ₅ H ₁₀ O ₃ N ₂ ⁺⁻	ac	-805.00	-528.02	251.04	
Glicina	C ₂ H ₅ O ₂ N	s	-537.23	-377.69	103.51	99.20
		eq am	-523.00	-379.91	158.57	
Glicina, ion	C ₂ H ₆ O ₂ N ⁺	ac	-527.18	-393.30	189.54	171.54
Glicina, ion dipolar	C ₂ H ₅ O ₂ N ⁺⁻	ac	-523.00	-379.91	158.57	36.82
Glicinato, ion	C ₂ H ₄ O ₂ N ⁻	aq	-478.65	-324.09	120.50	54.81
Glicilglicina	C ₄ H ₈ O ₃ N ₂	s	-746.01	-491.50	189.95	163.59
		eq am	-734.25	-493.08		232.21
Glicilglicina, ion	C ₄ H ₉ O ₃ N ₂ ⁺	ac	-735.72	-510.87	286.60	288.70
Glicilglicina, ion dipolar	C ₄ H ₈ O ₃ N ₂ ⁺⁻	ac	-734.25	-492.08	231.38	158.99
Gliciglicinato, ion	C ₄ H ₇ O ₃ N ₂ ⁻	ac	-689.90	-445.76	222.17	
Acido α -Cetoglutarico	C ₅ H ₆ O ₅	s	-1026.34			
α -Cetoglutarato, ion	C ₅ H ₄ O ²⁻	ac		-793.41		
Acido L(+)lactico	C ₃ H ₆ O ₃	s	-694.04	-523.25	143.51	127.61
		ac	-686.22	-538.77	221.75	
		eq am	-686.64	-557.35		
L(+)Lactato, ion	C ₃ H ₅ O ₃ ⁻	ac	-686.64	-516.72	146.44	
Acido DL-láctico	C ₃ H ₆ O ₃	l	-673.62	-518.82	192.05	211.29
α -Lactosa	C ₁₂ H ₂₂ O ₁₁	s	-2221.70			
		ac	-2232.37	-1564.90	394.13	
β -Lactosa	C ₁₂ H ₂₂ O ₁₁	s	-2236.77	-1566.91	386.18	410.45
α , β -Lactosa	C ₁₂ H ₂₂ O ₁₁	ac	-2233.09	-1567.33	399.57	
DL-Leucina	C ₆ H ₁₃ O ₂ N	s	-649.78	-358.57	207.11	195.39
L-Leucina	C ₆ H ₁₃ O ₂ N	s	-646.85	-356.48	209.62	208.36
		eq am	-643.37	-352.25	206.69	
L-Leucina, ion	C ₆ H ₁₄ O ₂ N ⁺	ac	-645.01	-365.56	246.44	-660.24
L-Leucina, ion dipolar	C ₆ H ₁₃ O ₂ N ⁺⁻	ac	-643.37	-352.25	207.53	506.26
L-Leucinato, ion	C ₆ H ₁₂ O ₂ N ⁻	ac	-600.61	-296.60	164.43	447.69
Acido L-málico	C ₄ H ₆ O ₅	s	-1103.32			
		ac		-891.61		
		eq am		-925.08		
L-Hidrogenomalato, ion	C ₄ H ₅ O ₅ ⁻	ac		-871.95		
L-Malato, ion	C ₄ H ₄ O ₅ ²⁻	ac	-842.66			
Acido DL-málico	C ₄ H ₆ O ₅	s	-1105.41			
α -Maltosa	C ₁₂ H ₂₂ O ₁₁	ac	-2238.27	-1573.60	403.34	
β -Maltosa	C ₁₂ H ₂₂ O ₁₁	ac	-2237.73	-1572.18	400.41	
α , β -Maltosa	C ₁₂ H ₂₂ O ₁₁	ac	-2238.06	-1574.69	407.94	
β -Maltosa, monohidrato	C ₁₂ H ₂₄ O ₁₂	s	-2539.27	-1809.58	417.56	453.96
Metano	CH ₄	g	-74.85	-50.79	186.19	35.73
Metanol	CH ₃ OH	l	-238.66	-166.31	126.78	81.59
		ac	-245.89	-175.23	132.34	
L-Metionina	C ₅ H ₁₁ O ₂ NS	s	-761.07	-508.36	231.46	290.20

Tabla A3-2 (continuación).

Compuesto	Fórmula	Estado	$\Delta \bar{H}_f^\circ$ (kJ mol ⁻¹)	$\Delta \bar{G}_f^\circ$ (kJ mol ⁻¹)	\bar{S}° (J K ⁻¹ mol ⁻¹)	\bar{C}_p° (J K ⁻¹ mol ⁻¹)
L-Metionina, ion	C ₅ H ₁₂ O ₂ NS ⁺	ac	-744.75			
L-Metionina, ion dipolar	C ₅ H ₁₁ O ₂ NS ⁺⁻	ac	-744.33			
Acido oxalacético	C ₄ H ₄ O ₅	s	-984.50			
		ac	-832.62			
Hidrogenoxalacetato ion	C ₄ H ₃ O ₅ ⁻	eq am	-875.71			
Oxalecetato ion	C ₄ H ₂ O ₅ ²⁻	ac	-818.39			
Acido palmítico	C ₁₆ H ₃₂ O ₂	s	-890.77	-315.06	455.22	460.66
		ac		-287.86		
		eq am		-299.16		
Palmitato, ion	C ₁₆ H ₃₁ O ₂ ⁻	ac		-259.41		
Acido pirúvico	C ₃ H ₄ O ₃	s	-585.76			
		ac	-607.52	-486.60	179.91	
		eq am	-596.22	-513.38		
Piruvato, ion	C ₃ H ₃ O ₃ ⁻	ac	-596.22	-472.37	171.54	
2-Propanol	C ₃ H ₇ OH	l	-317.86	-180.29	180.58	154.22
		ac	-330.83	-185.23	153.55	
Acido succínico	C ₄ H ₆ O ₄	s	-940.81	-747.35	175.73	153.97
		ac	-912.20	-746.64	269.45	230.12
		eq am	-908.72	-772.99	369.45	
Hidrogenosuccinato, ion	C ₆ H ₅ O ₄ ⁻	ac	-908.89	-722.62	199.99	96.23
Succinato, ion	C ₆ H ₄ O ₄ ²⁻	ac	-908.68	-690.44	92.88	122.59
Sacarosa	C ₁₂ H ₂₂ O ₁₁	s	-2221.70	-1544.31	360.24	425.51
		ac	-2215.85	-1551.43	403.76	633.04
DL-Valina	C ₅ H ₁₁ O ₂ N	s	-617.98	-359.82	181.17	
L-Valina	C ₅ H ₁₁ O ₂ N	s	-617.98	-358.99	178.74	168.82
		eq am	-617.98	-358.65	176.98	
L-Valina, ion	C ₅ H ₁₂ O ₂ N ⁺	ac	-612.24	-371.71	240.16	547.27
L-Valina, ion dipolar	C ₅ H ₁₁ O ₂ N ⁺⁻	ac	-611.99	-358.65	176.98	389.11
L-Valinato, ion	C ₅ H ₁₀ O ₂ N ⁻	ac	-567.43	-307.40	174.89	333.88