

MAGNITUDES TERMODINÁMICAS PARA SUSTANCIAS E IONES A 25° C

SUSTANCIA	ΔH° (KJ/mol)	ΔG° (KJ/mol)	S° (J/mol - K)
e ⁻ (g)	0	0	20.87
H ⁺ (g)	1536.3	1517.1	108.83
H ⁺ (ac)	0	0	0
H(g)	218.0	203.30	114.60
H ₂ (g)	0	0	130.6
<i>Grupo IA</i>			
Li ⁺ (g)	687.163	649.989	132.91
Li ⁺ (ac)	-278.46	-293.8	14
Li (g)	161	128	138.67
Li (s)	0	0	29.10
LiF (s)	-616.9	-558.7	35.66
LiCl (s)	-408	-384	59.30
LiBr (s)	-351	-342	74.1
Li I (s)	-270	-270	85.8
Na ⁺ (g)	609.839	574.877	147.85
Na ⁺ (ac)	-239.66	-261.87	60.2
Na (g)	107.76	77.299	153.61
Na (s)	0	0	51.446
NaF (s)	-575.4	-545.1	51.21
Na Cl (s)	-411.1	-384.0	72.12
Na Br (s)	-361	-349	86.82
Na I (s)	-288	-285	98.5
Na HCO ₃ (s)	-947.7	-851.9	102
Na ₂ CO ₃ (s)	-1130.8	-1048.1	139
K ⁺ (g)	514.197	481.202	154.47
K ⁺ (ac)	-251.2	-282.28	103
K (g)	89.2	60.7	160.23
K(s)	0	0	64.672
KF (s)	-568.6	-538.9	66.55
KCl (s)	-436.68	-408.8	82.55
KBr (s)	-394	-380	95.94
KI (s)	-328	-323	106.39
Rb ⁺ (g)	495.04	-282.2	124
Rb ⁺ (ac)	-246	55.86	169.99
Rb ⁺ (g)	85.81	0	69.5
Rb ⁺ (s)	0		
Rb F(s)	-549.28		
Rb Cl(s)	-430.58		
Rb Br(s)	-389.2	-378.1	108.3
Rb I(s)	-328	-326	118.0
Cs ⁺ (g)	458.5	427.1	169.72
Cs ⁺ (ac)	-248	-282.0	133
Cs ⁺ (g)	76.7	49.7	175.5
Cs ⁺ (s)	0	0	85.15
Cs F(s)	-554.7	-525.4	88
Cs Cl(s)	-442.8	-414	101.18
Cs Br(s)	-395	-383	121
Cs I(s)	-337	-333	130
Grupo IIA			
Mg ²⁺ (g)	2351		

Mg ²⁺ (ac)	-461.96	-456.01	-118
Mg ⁺ (g)	894.1		
Mg(g)	150	115	148.55
Mg(s)	0	0	32.69
MgCl ₂ (s)	-641.6	-592.1	89.630
MgO(s)	-601.2	-569.0	26.9
Mg ₃ N ₂ (s)	-461	-401	88
MgCO ₃ (s)	-1112	-1028	65.86
Ca ²⁺ (g)	1934.1		
Ca ²⁺ (ac)	-542.96	-553.04	-55.2
Ca ⁺ (g)	788.6		
Ca(g)	192.6	158.9	154.78
Ca(s)	0	0	41.6
CaF ₂ (s)	-1215	-1162	68.87
CaCl ₂ (s)	-795.0	-750.2	114
CaO(s)	-635.1	-603.5	38.2
CaCO ₃ (s)	-1206.9	-1128.8	92.9
CaSO ₄ (g)	-1432.7	-1320.3	107
Ca ₃ (PO ₄) ₂ (s)	-4138	-3899	263
Sr ²⁺ (g)	1784		
Sr ²⁺ (ac)	-545.51	-557.3	-39
Sr ⁺ (g)	719.6		
Sr(g)	164	110	164.54
Sr(s)	0	0	54.4
SrCl ₂ (s)	-828.4	-781.2	117
SrO(s)	-592.0	-562.4	55.5
SrCO ₃ (s)	-1218	-1138	97.1
SrSO ₄ (s)	-1445	-1334	122
Ba ²⁺ (g)	1649.9		
Ba ²⁺ (ac)	-538.36	-560.7	13
Ba ⁺ (g)	684.6		
Ba(g)	175.6	144.8	170.28
Ba(s)	0	0	62.5
BaCl ₂ (s)	-806.06	-810.9	126
BaO(s)	-548.1	-520.4	72.07
BaCO ₃ (s)	-1219	-1139	112
BaSO ₄ (s)	-1465	-1353	132
Grupo IIIA			
B((b) – romboédrico)	0	0	5.87
B ₂ O ₂ (s)	-1272	-1193	53.8
Al(s)	0	0	28.3
Al ³⁺ Cac)	-524.7	-481.2	-313
Al ₂ O ₃ (s)	-1676	-1582	50.94
Grupo IVA			
C(g)	715.0	669.6	158.0
C(grafito)	0	0	5.686
C(diamantes)	1.896	2.866	2.439
CO(g)	-110.5	137.2	197.5
CO ₂ (g)	-393.5	-394.4	213.7
CO ₂ (ac)	412.9	-386.2	121
CO ₃ ²⁻ (ac)	-676.26	-528.10	-53.1
HCO ₃ ⁻ (ac)	-691.11	-587.06	95.0

H ₂ CO ₃ (ac)	-698.7	-623.42	191
CH ₄ (g)	-74.87	-50.81	186.1
C ₂ H ₂ (g)	227	209	200.85
C ₂ H ₄ (g)	52.47	68.36	218.22
C ₂ H ₆ (g)	-84.667	-32.89	229.5
C ₆ H ₆ (l)	49.0	124.5	172.8
CH ₃ OH(g)	-201.2	-161.9	238
CH ₃ OH(l)	-238.6	-166.2	127
HCHO(g)	-116	-110	219
HCOO ⁻ (a)	-410	-335	91.6
HCOOH(l)	-409	-346	129.0
HCOOH(ac)	-410	-356	164
C ₂ H ₅ OH(l)	-277.63	-174.8	161
CH ₃ CHO(g)	-166	-133.7	266
CH ₃ COOH(l)	-487.0	-392	160
CN ⁻ (ac)	151	166	118
HCN(g)	135	125	201.7
HCN(l)	105	121	112.8
HCN(ac)	105	112	129
CS ₂ (g)	117	66.9	237.79
CS ₂ (l)	87.9	63.6	151.0
CH ₃ Cl(g)	-83.7	-60.2	234
CH ₂ Cl ₂ (l)	-117	-63.2	179
CHCl ₃ (l)	-132	-71.5	203
CCl ₄ (g)	-96.0	-53.7	309.7
CCl ₄ (l)	-139	-68.6	214.4
COCl ₂ (g)	-220	-206	283.74
Si(s)	0	0	18.0
SiO ₂ (s)	-910.9	-86.5	41.5
Sn(gris)	3	4.6	44.8
Sn(blanco)	0	0	51.5
SnCl ₄ (l)	-545.2	-474.0	259
Pb ²⁺ (ac)	1.6	-24.3	21
Pb(s)	0	0	64.785
PbO(s, rojo)	-219.0	-189.2	66.5
PbO ₂ (s)	-276.6	-219.0	76.6
PbS(s)	-98.3	-96.7	91.3
PbCl ₂ (s)	-359	-314	136
PbSO ₄ (s)	-918.39	-811.24	147
Grupo VA			
N(g)	473	456	153.2
N ₂ (g)	0	0	191.5
NO(g)	90.29	86.60	210.65
NO ₂ (g)	33.2	51	239.9
N ₂ O ₄ (g)	9.16	97.7	304.3
N ₂ O ₅ (g)	11	118	346
NH ₃ (g)	-45.9	-16	193
NH ₃ (ac)	-80.83	26.7	110
NO ₃ ⁻ (ac)	-206.57	-110.5	146
HNO ₃ (l)	-173.23	-79.914	155.6
HNO ₃ (ac)	-206.57	-110.5	146
NH ₄ NO ₃ (s)	-365.6	-184.0	151.1
P(g)	333.9	292.0	163.1
P(rojo)	0	0	22.8
P ₄ (blanco)	69.8	48.0	164
P ₂ (g)	146.2	103.8	218.0

P ₄ (g)	128.9	72.4	128.9
PCl ₅ (g)	-287	-267.8	311.7
P ₄ O ₁₀ (s)	-343	-278	364.5
PO ₄ ³⁻ (ac)	-2940	-2675	228.9
HPO ₄ ²⁻ (ac)	-1277	-1018	-222
H ₂ PO ₄ ⁻ (ac)	-1292.1	-1089.3	-33
H ₃ PO ₄ (ac)	-1296.3	-1130.4	90.4
	-1288.3	-1142.7	158
Grupo VIA			
O(g)	249.2	231.7	160.95
O ₂ (g)	0	0	205.0
O ₃ (g)	143	163	238.82
OH ⁻ (ac)	-229.94	-157.30	-10.54
H ₂ O(g)	-241.826	-228.60	188.72
H ₂ O(l)	-285.840	-237.192	69.940
H ₂ O ₂ (l)	-187.8	-120.4	110
H ₂ O ₂ (ac)	-191.2	-134.1	144
S(g)	279	239	168
S ₂ (g)	129	80.1	228.1
S ₈ (g)	101	49.1	430.211
S (rómico)	0	0	31.9
S(monoclínico)	0.30	0.096	32.6
S ²⁻ (ac)	41.8	83.7	22
HS ⁻ (ac)	-17.7	12.6	61.1
H ₂ S(g)	-20.2	-33	205.6
H ₂ S(ac)	-39	-27.4	122
SO ₂ (g)	-296.8	-300.2	248.1
SO ₃ (g)	-396	-371	256.66
SO ₄ ²⁻ (ac)	-907.51	-741.99	17
HSO ₄ ⁻ (ac)	-885.75	-752.87	126.9
H ₂ SO ₄ (l)	-813.989	-690.059	156.90
H ₂ SO ₄ (ac)	-907.51	-741.99	17
Grupo VIIA			
F(g)	78.9	61.8	158.64
F ⁻ (g)	-255.6	-262.5	145.47
F ⁻ (ac)	-329.1	-276.5	-9.6
F ₂ (g)	0	0	202.7
HF(g)	-273	-275	173.67
Cl(g)	121.0	105.0	165.1
Cl ⁻ (g)	-234	-240	153.25
Cl ⁻ (ac)	-167.46	-131.17	55.10
Cl ₂ (g)	0	0	223.0
HCl(g)	-92.31	-95.30	186.79
HCl(ac)	-167.46	-131.17	55.06
Br(g)	111.9	82.40	174.90
Br ⁻ (g)	-218.9		
Br ⁻ (ac)	-120.9	-102.82	80.71
Br ₂ (g)	30.91	3.13	245.78
Br ₂ (l)	0	0	152.23
HBr(g)	-36	-53.5	198.59
I(g)	106.8	70.21	180.67
I ⁻ (g)	-194.7		
I ⁻ (ac)	-55.94	-51.67	109.4

I ₂ (g)	62.442	19.38	260.58
I ₂ (s)	0	0	116.14
HI(g)	25.9	1.3	206.33
Grupo IB			
Cu ⁺ (ac)	51.9	50.2	-26
Cu ²⁺ (ac)	64.39	64.98	-98.7
Cu(g)	341.1	301.4	166.29
Cu(s)	0	0	33.1
Ag ⁺ (ac)	105.9	77.111	73.93
Ag(g)	289.2	250.4	172.892
Ag(s)	0	0	42.702
AgF(s)	-203	-185	84
AgCl(s)	-127.03	-109.72	96.11
AgBr(s)	-99.50	-95.939	107.1
AgI(s)	-62.38	-66.32	114
Ag ₂ S(s)	-31.8	-40.3	146
Grupo IIB			
Zn ²⁺ (ac)	-152.4	-147.21	-106.5
Zn(g)	130.5	94.93	160.9
Zn(s)	0	0	41.6
ZnO(s)	-348.0	-318.2	43.9
ZnS(s, blenda de zinc)	-203	-198	57.7
Cd ²⁺ (ac)	-72.38	-77.74	-61.1
Cd(g)	112.8	78.20	167.64
Cd(s)	0	0	51.5
CdS(s)	-144	-141	71
Hg ²⁺ (ac)		164.8	
Hg ₂ ²⁺ (ac)		153.9	
Hg(g)	61.30	31.8	174.87
Hg(l)	0	0	76.027
HgCl ₂ (s)	-230	-184	144
Hg ₂ Cl ₂ (s)	-264.9	-210.66	196
HgO(s)	-90.79	-58.50	70.27
Grupo VIB			
(Cr (H ₂ O) ₆) ₃ ⁺ (ac)	-1971		
Cr(s)	0	0	23.8
CrO ₄ ²⁻ (ac)	-863.2	-706	38
Cr ₂ O ₇ ²⁻ (ac)	-1461	-1257	214
Grupo VIIB			
Mn ²⁺ (ac)	-219	-223	-84
Mn(s,a)	0	0	31.8
MnO ₂ (s)	-520.9	-466.1	53.1
MnO ₄ ⁻ (ac)	-518.4	-425.1	190
Grupo VIIIB			
Fe ³⁺ (ac)	-47.7	-10.5	-293
Fe ²⁺ (ac)	-87.9	-84.94	113
Fe(s)	0	0	27.3
Fe(l)	13.13	11.05	34.29

FeO(s)	-272.0	-251.4	60.75
Fe ₂ O ₃ (s)	-825.5	-743.6	87.400
Fe ₃ O ₄ (s)	-1121	-1018	145.3
Co ²⁺ (ac)	-67.4	-51.5	-155
Co(s)	0	0	30
Ni ²⁺ (ac)	-64.0	-46.4	-159
Ni(s)	0	0	30.1

CAPACIDADES CALORÍFICAS MOLARES DE GASES A PRESIÓN CONSTANTE(De acuerdo a la expresión $C_p = a + bT + cT^2$)

(Válidas para temperaturas entre 300 – 1500 K)

cal/K-mol

H ₂	$C_p = 6.947 - 0.00020T + 0.48 \cdot 10^{-6} T^2$
O ₂	$C_p = 6.148 - 0.00310T - 0.92 \cdot 10^{-6} T^2$
N ₂	$C_p = 6.524 - 0.00125T - 0.001 \cdot 10^{-6} T^2$
Cl ₂	$C_p = 7.576 - 0.00242T - 0.97 \cdot 10^{-6} T^2$
CO	$C_p = 6.420 - 0.00167T - 0.196 \cdot 10^{-6} T^2$
CO ₂	$C_p = 6.214 - 0.0104T - 3.55 \cdot 10^{-6} T^2$
H ₂ O(v)	$C_p = 7.256 - 0.00230T + 0.28 \cdot 10^{-6} T^2$
NH ₃	$C_p = 6.189 - 0.00789T - 0.73 \cdot 10^{-6} T^2$
SO ₂	$C_p = 6.147 - 0.0138T - 9.10 \cdot 10^{-6} T^2$
CH ₄	$C_p = 3.381 - 0.0180T - 4.30 \cdot 10^{-6} T^2$
C ₂ H ₆	$C_p = 2.247 - 0.0382T - 11.05 \cdot 10^{-6} T^2$
C ₂ H ₄	$C_p = 2.830 - 0.0286T + 8.73 \cdot 10^{-6} T^2$

PRESIÓN DE VAPOR DEL AGUA

Temperatura (°C)	Presión (mmHg)	Temperatura (°C)	Presión (mmHg)
0	4.6	27	26.7
5	6.5	28	28.3
10	9.2	29	30.0
11	9.8	30	31.8
12	10.5	35	42.2
13	11.2	40	55.3
14	12.0	45	71.9
15	12.8	50	92.5
16	13.6	55	118.0
17	14.5	60	149.4
18	15.5	65	187.5
19	16.5	70	233.7
20	17.5	75	289.7
21	18.7	80	355.1
22	19.8	85	433.6
23	21.1	90	525.8
24	22.4	95	633.9
25	23.8	100	760.0
26	25.2	105	906.1