TABLE 5–1. Chemical Thermodynamic Properties of Selected Substances at 298.15 K (25°C) and 0.1 MPa (1 bar)

Substance	Phase*	Molar Mass (g/mol)	$\Delta_f H^0$ (kJ/mol)	$\Delta_f G^0$ (kJ/mol)	log K_f	S^0 (J/mol-K)	C_p (J/mol-K)
Al (crystal)	s	29.9815	0	0	0	28.275	24.204
Al_2O_3	l	101.9612	−1620.567	−1532.025	268.404	67.298	79.015
C (graphite)	s	12.011	0	0	0	5.740	8.517
CH_4	g	16.0476	−74.873	−50.768	8.894	186.251	35.639
CO	g	28.0106	−110.527	−137.163	24.030	197.653	29.142
CO_2	g	44.010	−393.522	−394.389	69.095	213.795	37.129
H_2	g	2.01583	0	0	0	130.680	28.836
HCl	g	36.4610	−92.312	−95.300	16.696	186.901	29.136
HF	g	20.0063	−272.546	−274.646	48.117	172.780	29.138
H_2O	l	18.01528	−285.830	−237.141	41.546	69.950	75.351
H_2O	g	18.01528	−241.826	−228.582	40.047	188.834	33.590
N_2H_4	l	32.0451	+50.626	149.440	−28.181	121.544	98.840
N_2H_4	g	32.0451	+95.353	+159.232	−27.897	238.719	50.813
NH_4ClO_4	s	117.485	−295.767	−88.607	15.524	184.180	128.072
ClF_5	g	130.4450	−238.488	−146.725	25.706	310.739	97.165
ClF_3	g	92.442	−158.866	−118.877	20.827	281.600	63.845
N_2O_4	l	92.011	−19.564	+97.521	−17.085	209.198	142.509
N_2O_4	g	92.011	9.079	97.787	−17.132	304.376	77.256
NO_2	g	46.0055	33.095	51.258	−8.980	240.034	36.974
HNO_3	g	63.0128	−134.306	−73.941	12.954	266.400	53.326
N_2	g	28.0134	0	0	0	191.609	29.125
O_2	g	31.9988	0	0	0	205.147	29.376
NH_3	g	17.0305	−45.898	−16.367	2.867	192.774	35.652

*s = solid, l = liquid, g = gas. Several species are listed twice, as a liquid and as a gas; the difference is due to evaporation or condensation. The molar mass can be in g/g-mol or kg/kg-mol and C_p can be in J/g-mol-K or kJ/kg-mol-K.

Source: Refs. 5–8 and 5–9.