

BOND DISSOCIATION ENERGIES

Yu-Ran Luo

The bond dissociation energy (enthalpy) is also referred to as bond disruption energy, bond energy, bond strength, or binding energy (abbreviation: BDE, BE, or D). It is defined as the standard enthalpy change of the following fission: $R-X \rightarrow R + X$. The BDE, denoted by $D^{\circ}(R-X)$, is usually derived by the thermochemical equation, $D^{\circ}(R-X) = \Delta_f H^{\circ}(R) + \Delta_f H^{\circ}(X) - \Delta_f H^{\circ}(RX)$. The enthalpy of formation $\Delta_f H^{\circ}$ of a large number of atoms, free radicals, ions, clusters and compounds is available from the websites of NIST, NASA, CODATA, and IUPAC. Most authors prefer to use the BDE values at 298.15 K.

The following seven tables provide essential information of experimental BDE values of $R-X$ and R^+-X bonds.

- (1) Table 1: Bond Dissociation Energies in Diatomic Molecules
- (2) Table 2: Enthalpy of Formation of Gaseous Atoms
- (3) Table 3: Bond Dissociation Energies in Polyatomic Molecules
- (4) Table 4: Enthalpies of Formation of Free Radicals and Other Transient Species
- (5) Table 5: Bond Dissociation Energies of Common Organic Molecules
- (6) Table 6: Bond Dissociation Energies in Diatomic Cations
- (7) Table 7: Bond Dissociation Energies in Polyatomic Cations

The data in these tables have been revised through September 2009.

TABLE 1. Bond Dissociation Energies in Diatomic Molecules

The BDEs in diatomic species have usually been measured by spectroscopy or mass spectrometry. In the absence of data on the enthalpy function, the values at 0 K, $D^{\circ}(A-B)$, are converted to D°_{298} by the approximate equation:

$$D^{\circ}_{298}(A-B) \approx D^{\circ}(A-B) + (3/2)RT = D^{\circ}(A-B) + 3.7181 \text{ kJ mol}^{-1}$$

This table has been arranged in an alphabetical order of the atoms A in the diatomics A-B.

A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.	A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.	A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.	A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.
Ac-O	794	1	Ag-Sn	136 ± 21	1	Al-Sb	216.3 ± 6	1	Ar-Si	5.86	1
Ag-Ag	162.9 ± 2.9	1	Ag-Te	195.8 ± 14.6	1	Al-Se	318 ± 13	1	Ar-Sn	<5.1	1
Ag-Al	183.7 ± 9.2	1	Al-Al	264.3 ± 0.5	1	Al-Si	246.9 ± 12.6	1	Ar-Tl	4.09	1
Ag-Au	202.5 ± 9.6	1	Al-Ar	5.69	1	Al-Te	268 ± 13	1	Ar-Xe	5.28	1
Ag-Bi	192 ± 42	1	Al-As	202.7 ± 7.1	1	Al-Ti	263.4	1	Ar-Zn	5.0	1
Ag-Br	280.3 ± 1.3	1	Al-Au	325.9 ± 6.3	1	Al-U	326 ± 29	1	As-As	385.8 ± 10.5	1
Ag-Cl	279.1 ± 8.4	1	Al-Br	429.2 ± 5.8	1	Al-V	147.4 ± 1.0	1	As-Cl	448	1
Ag-Cu	171.5 ± 9.6	1	Al-C	267.7	1	Al-Xe	7.39	1	As-D	270.3	1
Ag-D	226.8	1	Al-Ca	52.7	1	Am-O	553 ± 36	1	As-F	410	1
Ag-Dy	130 ± 19	1	Al-Cl	502	1	Ar-Ar	4.91	1	As-Ga	202.5 ± 4.8	1
Ag-Eu	127 ± 13	1	Al-Co	181.6 ± 0.2	1	Ar-B	4.62	1	As-H	274.0 ± 2.9	1
Ag-F	356.9 ± 5.8	1	Al-Cr	222.9 ± 0.9	1	Ar-Br	~5.0	1	As-I	296.6 ± 24	1
Ag-Ga	159 ± 17	1	Al-Cu	227.1 ± 1.2	1	Ar-C	5.158	1	As-In	201 ± 10	1
Ag-Ge	174.5 ± 21	1	Al-D	290.4	1	Ar-Ca	4.44 ± 0.60	1	As-N	489 ± 2.1	1
Ag-H	202.4 ± 9.1	1	Al-F	675	1	Ar-Cd	5.57 ± 0.05	1	As-O	484 ± 8	1
Ag-Ho	124 ± 19	1	Al-H	288 ± 13	1	Ar-Ga	3.96	1	As-P	433.5 ± 12.6	1
Ag-I	234 ± 29	1	Al-I	369.9 ± 2.1	1	Ar-Ge	<5.4	1	As-S	379.5 ± 6.3	1
Ag-In	166.5 ± 4.9	1	Al-Kr	6.05	1	Ar-He	3.96	1	As-Sb	330.5 ± 5.4	1
Ag-Li	186.1	1	Al-Li	76.1	1	Ar-Hg	5.32	1	As-Se	96	1
Ag-Mn	99.2 ± 21	1	Al-N	≤368 ± 15	1	Ar-I	~5.3	1	As-Tl	198.3 ± 14.6	1
Ag-Na	133.1 ± 12.6	1	Al-Ne	3.9	1	Ar-In	4.18	1	Au-Au	226.2 ± 0.5	1
Ag-Nd	<213	1	Al-Ni	224.7 ± 4.8	1	Ar-Kr	5.11	1	Au-B	367.8 ± 10.5	1
Ag-O	221 ± 21	1	Al-O	501.9 ± 10.6	1	Ar-Li	~7.82	1	Au-Ba	254.8 ± 10.0	1
Ag-S	216.7 ± 14.6	1	Al-P	216.7 ± 12.6	1	Ar-Mg	~3.7	1	Au-Be	237.7 ± 4.0	1
Ag-Se	210.0 ± 14.6	1	Al-Pd	254.4 ± 12.1	1	Ar-Na	~4.2	1	Au-Bi	293 ± 8.4	1
Ag-Si	185.1 ± 9.6	1	Al-S	332 ± 10	1	Ar-Ne	4.27	1	Au-Br	213 ± 21	1

A–B	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	A–B	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	A–B	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	A–B	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.
Au–Ca	250.4 ± 4.0	1	B–H	345.2 ± 2.5	1	Bi–O	337.2 ± 12.6	1	Br–Sb	314 ± 59	1
Au–Ce	322 ± 18	1	B–I	361	1	Bi–P	281.7 ± 13	1	Br–Sc	444 ± 63	1
Au–Cl	280 ± 13	1	B–Ir	512.2 ± 17	1	Bi–Pb	142.4 ± 3.0	1	Br–Se	297 ± 84	1
Au–Co	218.0 ± 16.4	1	B–La	335 ± 63	1	Bi–S	315.5 ± 4.6	1	Br–Si	358.2 ± 8.4	1
Au–Cr	223.7 ± 28.9	1	B–N	377.9 ± 8.7	1	Bi–Sb	252.7 ± 3.9	1	Br–Sm	331.4	1
Au–Cs	253 ± 3.5	1	B–Ne	3.97	1	Bi–Se	280.3 ± 5.9	1	Br–Sn	337 ± 13	1
Au–Cu	227.1 ± 1.2	1	B–O	809	1	Bi–Sn	193 ± 13	1	Br–Sr	365	1
Au–D	322.2	1	B–P	347 ± 16.7	1	Bi–Te	232.2 ± 11.3	1	Br–T	372.77	1
Au–Dy	259 ± 24	1	B–Pd	351.5 ± 16.7	1	Bi–Tl	120.9 ± 12.6	1	Br–Tb	382.8	1
Au–Eu	245 ± 12	1	B–Pt	477.8 ± 16.7	1	Bk–O	598	1	Br–Th	364	1
Au–F	294.1	1	B–Rh	475.8 ± 21	1	Br–Br	193.859 ± 0.120	1	Br–Ti	373	1
Au–Fe	187.0 ± 19.3	1	B–Ru	446.9 ± 21	1	Br–C	318.0 ± 8.4	1	Br–Tl	331 ± 21	1
Au–Ga	290 ± 15	1	B–S	577 ± 9.2	1	Br–Ca	339	1	Br–Tm	299.1	1
Au–Ge	273.2 ± 14.6	1	B–Sc	272 ± 63	1	Br–Cd	159 ± 96	1	Br–U	377 ± 15	1
Au–H	300.5 ± 2.6	4	B–Se	462 ± 14.6	1	Br–Ce	373.2	1	Br–V	439 ± 42	1
Au–Ho	267 ± 35	1	B–Si	317 ± 12	1	Br–Cl	219.32 ± 0.05	1	Br–W	329.3	1
Au–I	276	1	B–Te	354 ± 20	1	Br–Co	326 ± 42	1	Br–Xe	5.94 ± 0.02	1
Au–In	286.0 ± 5.7	1	B–Th	297 ± 33	1	Br–Cr	328.0 ± 24.3	1	Br–Y	481 ± 84	1
Au–La	457 ± 28	1	B–Ti	272 ± 63	1	Br–Cs	389.1 ± 4.2	1	Br–Yb	295.4	1
Au–Li	284.5 ± 6.7	1	B–U	322 ± 33	1	Br–Cu	331 ± 25	1	Br–Zn	138 ± 29	1
Au–Lu	332 ± 19	1	B–Y	289 ± 63	1	Br–D	370.74	1	Br–Zr	420	1
Au–Mg	179.1 ± 2.7	1	Ba–Br	402	1	Br–Dy	339.3 ± 10.5	1	C–C	618.3 ± 15.4	1
Au–Mn	197.7 ± 21	1	Ba–Cl	443	1	Br–Er	361.3	1	C–Ce	443 ± 30	1
Au–Na	215.1 ± 12.6	1	Ba–D	≤193.7	1	Br–Eu	548	1	C–Cl	394.9 ± 13.4	1
Au–Nd	294 ± 29	1	Ba–F	580.6	1	Br–F	280 ± 12	1	C–D	341.4	1
Au–Ni	247 ± 16.4	1	Ba–H	192.0	1	Br–Fe	243 ± 84	1	C–F	513.8 ± 10.0	1
Au–O	223 ± 21	1	Ba–I	322.6 ± 6.3	1	Br–Ga	402 ± 13	1	C–Fe	376.3 ± 28.9	1
Au–Pb	133 ± 42	1	Ba–O	562 ± 13.4	1	Br–Gd	372.0	1	C–Ge	455.7 ± 11	1
Au–Pd	142.7 ± 21	1	Ba–Pd	221.8 ± 5.0	1	Br–Ge	347 ± 8	1	C–H	338.4 ± 1.2	1
Au–Pr	311 ± 25	1	Ba–Rh	259.4 ± 25	1	Br–H	366.16 ± 0.20	1	C–Hf	540 ± 25	1
Au–Rb	243 ± 3.5	1	Ba–S	418 ± 21	1	Br–Hg	74.9	1	C–I	253.1 ± 35.6	1
Au–Rh	232.6 ± 29	1	Be–Be	59	1	Br–Ho	321.8	1	C–Ir	631 ± 5	1
Au–S	253.6 ± 14.6	1	Be–Br	316	1	Br–I	179.1 ± 0.4	1	C–La	463 ± 20	1
Au–Sc	280 ± 40	1	Be–Cl	434	1	Br–In	409 ± 10	1	C–Mo	482 ± 16	1
Au–Se	251.0 ± 14.6	1	Be–D	203.1	1	Br–K	379.1 ± 4.2	1	C–N	750.0 ± 2.9	1
Au–Si	304.6 ± 6.0	1	Be–F	573	1	Br–La	446.2	1	C–Nb	523.8 ± 14.5	1
Au–Sn	256.5 ± 7.2	1	Be–H	221	1	Br–Li	418.8 ± 4.2	1	C–Ni	337.0	1
Au–Sr	264 ± 42	1	Be–I	261	1	Br–Lu	301.5	1	C–O	1076.38 ± 0.67	1
Au–Tb	285 ± 33	1	Be–O	437	1	Br–Mg	317.96	1	C–Os	608 ± 25	1
Au–Te	237.2 ± 14.6	1	Be–S	372 ± 59	1	Br–Mn	314.2 ± 9.6	1	C–P	507.5 ± 8.8	1
Au–U	318 ± 29	1	Be–T	204.4	1	Br–Mo	313.4	1	C–Pd	436 ± 20	1
Au–V	246.0 ± 8.7	1	Bi–Bi	204.4	1	Br–N	280.8 ± 21	1	C–Pt	577.8 ± 6.8	13
Au–Y	310 ± 12	1	Bi–Br	240.2	1	Br–Na	363.1 ± 4.2	1	C–Rh	580 ± 4	1
B–B	290	1	Bi–Cl	300.4 ± 4.2	1	Br–Nd	339.7	1	C–Ru	648 ± 13	1
B–Br	390.9 ± 0.5	1	Bi–D	283.7	1	Br–Ni	360 ± 13	1	C–S	713.3 ± 1.2	1
B–C	448 ± 29	1	Bi–F	366.5 ± 12.5	1	Br–O	237.6 ± 0.4	1	C–Sc	444 ± 21	1
B–Cd	301.0	1	Bi–Ga	158.6 ± 16.7	1	Br–P	≤329	1	C–Se	590.4 ± 5.9	1
B–Ce	305 ± 21	1	Bi–H	≤283.3	1	Br–Pb	248.5 ± 14.6	1	C–Si	447	1
B–Cl	427	1	Bi–I	186.1 ± 5.8	1	Br–Pr	344.5	1	C–Tc	564 ± 29	1
B–D	341.0 ± 6.3	1	Bi–In	153.6 ± 1.7	1	Br–Rb	380.7 ± 4.2	1	C–Th	453 ± 17	1
B–F	732	1	Bi–Li	149.4	1	Br–S	218 ± 17	1	C–Ti	423 ± 30	1

A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.	A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.	A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.	A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.
C-U	455 ± 15	1	Cl-Cu	377.8 ± 7.5	1	Cl-Yb	374.5	1	Cu-In	187.4 ± 7.9	1
C-V	423 ± 24	1	Cl-D	436.303 ± 0.011	1	Cl-Zn	229 ± 8	1	Cu-Li	191.9	1
C-Y	418 ± 14	1	Cl-Dy	392.4	1	Cl-Zr	530	1	Cu-Na	176.1 ± 16.7	1
C-Zr	495.8 ± 38.6	1	Cl-Er	448.6	1	Cm-O	710 ± 45	15	Cu-Ni	201.7 ± 9.6	1
Ca-Ca	16.52 ± 0.11	1	Cl-Eu	405.5	1	Co-Co	<127	1	Cu-O	287.4 ± 11.6	1
Ca-Cl	409 ± 8.7	1	Cl-F	260.83	1	Co-Cu	161.1 ± 16.4	1	Cu-S	274.5 ± 14.6	1
Ca-D	≤169.9	1	Cl-Fe	335.5	11	Co-D	270.2 ± 5.8	1	Cu-Se	255.2 ± 14.6	1
Ca-F	529	1	Cl-Ga	463 ± 13	1	Co-F	431 ± 63	1	Cu-Si	221.3 ± 6.3	1
Ca-H	223.8	1	Cl-Gd	451.0	1	Co-Ge	230 ± 21	1	Cu-Sn	170 ± 10	1
Ca-I	284.7 ± 8.4	1	Cl-Ge	390.8 ± 9.6	1	Co-H	244.9 ± 4.8	1	Cu-Tb	191 ± 18	1
Ca-Kr	5.15 ± 0.72	1	Cl-H	431.361 ± 0.013	1	Co-I	280 ± 21	1	Cu-Te	230.5 ± 14.6	1
Ca-Li	84.9 ± 8.4	1	Cl-Hg	92.0 ± 9.2	1	Co-Mn	50 ± 8	1	D-D	443.3197 ± 0.0003	1
Ca-O	383.3 ± 5.0	1	Cl-Ho	409.1	1	Co-Nb	267.02 ± 0.10	1	D-F	576.236 ± 0.011	1
Ca-Pd	347 - 360	1	Cl-I	211.3 ± 0.4	1	Co-O	397.4 ± 8.7	1	D-Ga	<276.5	1
Ca-S	335 ± 21	1	Cl-In	436 ± 8	1	Co-S	331	1	D-Ge	≤322	1
Ca-Xe	7.31 ± 0.96	1	Cl-K	433.0 ± 8.4	1	Co-Sc	240.1	7	D-H	439.2223 ± 0.0002	1
Cd-Cd	7.36	1	Cl-La	521.6	1	Co-Si	274.4 ± 17	1	D-Hg	42.05	1
Cd-Cl	208.4	1	Cl-Li	469 ± 13	1	Co-Ti	235.37 ± 0.10	1	D-I	302.33	1
Cd-F	305 ± 21	1	Cl-Lu	325.7 ± 2	1	Co-Y	253.71 ± 0.10	1	D-In	246	1
Cd-H	69.0 ± 0.4	1	Cl-Mg	312	1	Co-Zr	306.39 ± 0.10	1	D-K	182.4	1
Cd-I	97.2 ± 2.1	1	Cl-Mn	337.6	11	Cr-Cr	152.0 ± 6	1	D-Li	240.24	1
Cd-In	134	1	Cl-N	333.9 ± 9.6	1	Cr-Cu	154.4 ± 14.5	1	D-Lu	302	1
Cd-K	7.3	1	Cl-Na	412.1 ± 8.4	1	Cr-F	523 ± 19	1	D-Mg	161.33 ± 0.32	1
Cd-Kr	5.17	1	Cl-Nd	418.7	1	Cr-Fe	~75	1	D-Mn	312 ± 6	1
Cd-Na	10.2	1	Cl-Ni	372.3	11	Cr-Ge	154 ± 7	1	D-N	341.6	1
Cd-Ne	3.97	1	Cl-O	267.47 ± 0.08	1	Cr-H	189.9 ± 6.7	1	D-Ni	≤302.9	1
Cd-O	236 ± 84	1	Cl-P	≤376	1	Cr-I	287.0 ± 24.3	1	D-O	429.64	1
Cd-S	208.5 ± 20.9	1	Cl-Pb	301 ± 50	1	Cr-N	377.8 ± 18.8	1	D-P	299.0	1
Cd-Se	127.6 ± 25.1	1	Cl-Pr	423.5	1	Cr-Nb	295.72 ± 0.06	1	D-Pt	≤350.2	1
Cd-Te	100.0 ± 15.1	1	Cl-Ra	343 ± 75	1	Cr-O	461 ± 8.7	1	D-S	350.62 ± 1.20	1
Cd-Xe	6.54	1	Cl-Rb	427.6 ± 8.4	1	Cr-Pb	105 ± 2	1	D-Si	302.5	1
Ce-Ce	251.7	1	Cl-S	241.8	1	Cr-S	331	1	D-Sr	167.7	1
Ce-Cl	457.0	1	Cl-Sb	360 ± 50	1	Cr-Sn	141 ± 3	1	D-T	444.91	1
Ce-F	582 ± 42	1	Cl-Sc	331	1	Cs-Cs	43.919 ± 0.010	1	D-Tl	193.0	1
Ce-I	333.8	1	Cl-Se	322	1	Cs-F	517.1 ± 7.7	1	D-Zn	88.7	1
Ce-Ir	575 ± 9	1	Cl-Si	416.7 ± 6.3	1	Cs-H	175.364	1	Dy-Dy	70.3	1
Ce-N	519 ± 21	1	Cl-Sm	418.7	1	Cs-Hg	8	1	Dy-F	531	1
Ce-O	790	1	Cl-Sn	350 ± 8	1	Cs-I	338.5 ± 2.1	1	Dy-I	269.0 ± 8.4	1
Ce-Os	524 ± 20	1	Cl-Sr	409	1	Cs-Li	72.9 ± 1.2	5	Dy-O	615	1
Ce-Pd	319 ± 21	1	Cl-T	438.64	1	Cs-Na	63.2 ± 1.3	1	Dy-S	414 ± 42	1
Ce-Pt	550 ± 5	1	Cl-Ta	544	1	Cs-O	293 ± 25	1	Dy-Se	322 ± 20	1
Ce-Rh	545 ± 7	1	Cl-Tb	470.1	1	Cs-Rb	49.57 ± 0.01	1	Dy-Te	234 ± 20	1
Ce-Ru	494 ± 12	1	Cl-Th	489	1	Cu-Cu	201	1	Er-Er	75 ± 29	1
Ce-S	569	1	Cl-Ti	405.4 ± 10.5	1	Cu-D	270.3	1	Er-F	565 ± 17	1
Ce-Se	494.5 ± 14.6	1	Cl-Tl	372.8 ± 2.1	1	Cu-Dy	144 ± 18	1	Er-I	315.8	1
Ce-Te	189.4 ± 12.6	1	Cl-Tm	378.0	1	Cu-F	414	1	Er-O	606	1
Cf-O	498	1	Cl-U	439	1	Cu-Ga	215.9 ± 15	1	Er-S	418 ± 21	1
Cl-Cl	436.303 ± 0.011	8	Cl-V	477 ± 63	1	Cu-Ge	208.8 ± 21	1	Er-Se	326 ± 20	1
Cl-Co	343.9	11	Cl-W	419	1	Cu-H	254.8 ± 6	1	Er-Te	238 ± 20	1
Cl-Cr	380.3	11	Cl-Xe	7.08	1	Cu-Ho	144 ± 19	1	Es-O	460	1
Cl-Cs	445.7 ± 7.7	1	Cl-Y	523 ± 84	1	Cu-I	289 ± 63	1	Eu-Eu	45.2	1

A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.	A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.	A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.	A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.
Eu-F	544	1	F-Ti	569 ± 33	1	H-Hg	39.844	1	Hg-T	43.14	1
Eu-I	288.3	1	F-Tl	439 ± 21	1	H-I	298.26 ± 0.10	1	Hg-Te	<142	1
Eu-Li	268.1 ± 12.6	1	F-Tm	510	1	H-In	243.1	1	Hg-Tl	2.9	1
Eu-O	473	1	F-U	648	1	H-K	174.576	1	Hg-Xe	6.65	1
Eu-Rh	238 ± 34	1	F-V	590 ± 63	1	H-Li	238.039 ± 0.006	1	Hg-Zn	7.3	1
Eu-S	365.7 ± 13.4	1	F-W	≤ 544	1	H-Mg	127.18 ± 0.006	10	Ho-Ho	70.3	1
Eu-Se	302.9 ± 14.6	1	F-Xe	14.18	1	H-Mn	251 ± 5	1	Ho-I	275.1	1
Eu-Te	251.0 ± 14.6	1	F-Y	685.3 ± 13.4	1	H-Mo	202.5 ± 18.3	9	Ho-O	606	1
F-F	158.670 ± 0.096	1	F-Yb	$\geq 517.6 \pm 9.6$	1	H-N	≤ 338.9	1	Ho-S	428.4 ± 14.6	1
F-Fe	447	1	F-Zn	364 ± 63	1	H-Na	185.69 ± 0.29	1	Ho-Se	333 ± 15	1
F-Ga	584 ± 13	1	F-Zr	627.2 ± 10.5	1	H-Nb	$>221.9 \pm 9.6$	1	Ho-Te	$\leq 259 \pm 15$	1
F-Gd	590 ± 17	1	Fe-Fe	118	1	H-Ni	240 ± 8	1	I-I	152.25 ± 0.57	1
F-Ge	523 ± 13	1	Fe-Ge	210.9 ± 29	1	H-O	429.91 ± 0.29	1	I-In	306.9 ± 1.1	1
F-H	569.680 ± 0.011	1	Fe-H	148 ± 3	1	H-P	297.0 ± 2.1	1	I-K	322.5 ± 2.1	1
F-Hf	650 ± 15	1	Fe-I	123	1	H-Pb	≤ 157	1	I-Kr	5.67	1
F-Hg	~ 180	1	Fe-O	407.0 ± 1.0	1	H-Pd	234 ± 25	1	I-La	411.7	1
F-Ho	540	1	Fe-S	328.9 ± 14.6	1	H-Pt	330	1	I-Li	345.2 ± 4.2	1
F-I	≤ 271.5	1	Fe-Si	297 ± 25	1	H-Rb	172.6	1	I-Lu	263.2	1
F-In	516 ± 13	1	Fm-O	443	1	H-Rh	241.0 ± 5.9	1	I-Mg	229	1
F-K	489.2	1	Ga-Ga	<106.4	1	H-Ru	223 ± 15	1	I-Mn	282.8 ± 9.6	1
F-Kr	6.6	1	Ga-H	265.9 ± 5.9	4	H-S	353.57 ± 0.30	1	I-Mo	266.9	1
F-La	659.0 ± 17.2	1	Ga-I	334 ± 13	1	H-Sb	239.7 ± 4.2	1	I-N	159 ± 17	1
F-Li	577 ± 21	1	Ga-In	94.0 ± 3	1	H-Sc	205 ± 17	1	I-Na	304.2 ± 2.1	1
F-Lu	405 ± 19	1	Ga-Kr	4.08	1	H-Se	312.5	1	I-Nd	301.5	1
F-Mg	463	1	Ga-Li	133.1 ± 14.6	1	H-Si	293.3 ± 1.9	1	I-Ni	293 ± 21	1
F-Mn	445.2 ± 7.5	1	Ga-O	374 ± 21	1	H-Sn	264 ± 17	1	I-O	233.4 ± 1.3	12
F-Mo	464	1	Ga-P	229.7 ± 12.6	1	H-Sr	164 ± 8	1	I-Pb	194 ± 38	1
F-N	≤ 349	1	Ga-Sb	192.0 ± 12.6	1	H-T	440.49	1	I-Pr	306.2	1
F-Na	477.3	1	Ga-Te	265 ± 21	1	H-Te	270.7 ± 1.7	1	I-Rb	318.8 ± 2.1	1
F-Nd	545.2 ± 12.6	1	Ga-Xe	5.27	1	H-Ti	204.6 ± 8.8	1	I-Si	243.1 ± 8.4	1
F-Ni	439.7 ± 5.9	2	Gd-Gd	206.3 ± 67.5	1	H-Tl	195.4 ± 4	1	I-Sm	293.1	1
F-Np	430 ± 50	1	Gd-I	333.8	1	H-V	209.3 ± 6.8	1	I-Sn	235 ± 3	1
F-O	220	1	Gd-O	715	1	H-Yb	183.1 ± 2.0	1	I-Sr	301	1
F-P	≤ 405	1	Gd-S	526.8 ± 10.5	1	H-Zn	85.8 ± 2	1	I-Tb	336.2	1
F-Pb	355 ± 13	1	Gd-Se	430 ± 15	1	He-He	3.809	1	I-Te	192 ± 42	1
F-Pr	582 ± 46	1	Gd-Te	341 ± 15	1	He-Hg	3.8	1	I-Th	361 ± 25	1
F-Pu	538 ± 29	1	Ge-Ge	264.4 ± 6.8	1	He-Xe	3.8	1	I-Ti	306	1
F-Rb	494 ± 21	1	Ge-H	263.2 ± 4.8	1	Hf-Hf	328 ± 58	1	I-Tl	285 ± 21	1
F-Ru	402	1	Ge-I	268 ± 25	1	Hf-N	535 ± 30	1	I-Tm	260.8	1
F-S	343.5 ± 6.7	1	Ge-Ni	290.3 ± 10.9	1	Hf-O	801 ± 13	1	I-U	299 ± 27	1
F-Sb	439 ± 96	1	Ge-O	657.5 ± 4.6	4	Hg-Hg	8.10 ± 0.18	1	I-Xe	~ 6.9	1
F-Sc	599.1 ± 13.4	1	Ge-Pb	145.3 ± 6.9	6	Hg-I	34.69 ± 0.96	1	I-Y	422.6 ± 12.5	1
F-Se	339 ± 42	1	Ge-Pd	254.7 ± 10.5	1	Hg-K	8.8	1	I-Yb	257.3	1
F-Si	576.4 ± 17	1	Ge-S	534 ± 3	1	Hg-Kr	5.75	1	I-Zn	153.1 ± 6.3	1
F-Sm	565	1	Ge-Sc	270 ± 11	1	Hg-Li	13.16 ± 0.38	1	I-Zr	127	1
F-Sn	476 ± 8	1	Ge-Se	484.7 ± 1.7	1	Hg-Na	10.8	1	In-In	82.0 ± 5.7	1
F-Sr	538	1	Ge-Si	297	1	Hg-Ne	4.14	1	In-Kr	4.85	1
F-T	579.009 ± 0.108	1	Ge-Sn	230.1 ± 13	1	Hg-O	269	1	In-Li	92.5 ± 14.6	1
F-Ta	573 ± 13	1	Ge-Te	396.7 ± 3.3	1	Hg-Rb	8.4	1	In-O	346 ± 30	1
F-Tb	561 ± 42	1	Ge-Y	279 ± 11	1	Hg-S	217.3 ± 22.2	1	In-P	197.9 ± 8.4	1
F-Th	652	1	H-H	435.7799 ± 0.0001	1	Hg-Se	144.3 ± 30.1	1	In-S	287.9 ± 14.6	1

A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.	A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.	A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.	A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.
In-Sb	151.9 ± 10.5	1	Lr-O	665	1	Nd-Te	305 ± 15	1	O-Zr	766.1 ± 10.6	1
In-Se	245.2 ± 14.6	1	Lu-Lu	142 ± 33	1	Ne-Ne	4.070	1	Os-Os	415 ± 77	1
In-Te	215.5 ± 14.6	1	Lu-O	669	1	Ne-Xe	4.31	1	P-P	489.1	1
In-Xe	6.48	1	Lu-Pt	402 ± 34	1	Ne-Zn	3.92	1	P-Pt	≤416.7 ± 16.7	1
In-Zn	32.2	1	Lu-S	508.4 ± 14.4	1	Ni-Ni	204	1	P-Rh	353.1 ± 16.7	1
Ir-Ir	361 ± 68	1	Lu-Se	418 ± 15	1	Ni-O	366 ± 30	1	P-S	442 ± 10	1
Ir-La	577 ± 12	1	Lu-Te	325 ± 15	1	Ni-Pd	140.9	1	P-Sb	356.9 ± 4.2	1
Ir-Nb	465 ± 25	1	Md-O	418	1	Ni-Pt	273.7 ± 0.3	1	P-Se	363.7 ± 10.0	1
Ir-O	414 ± 42	1	Mg-Mg	11.3	1	Ni-S	356 ± 21	1	P-Si	363.6	1
Ir-Si	462.8 ± 21	1	Mg-Ne	~4.1	1	Ni-Si	318 ± 17	1	P-Te	297.9 ± 10.0	1
Ir-Th	574 ± 42	1	Mg-O	358.2 ± 7.2	1	Ni-V	206.3 ± 0.2	1	P-Th	372 ± 29	1
Ir-Ti	422 ± 13	1	Mg-S	234	1	Ni-Y	283.92 ± 0.10	1	P-Tl	209 ± 13	1
Ir-Y	457 ± 15	1	Mg-Xe	9.70 ± 1.79	1	Ni-Zr	279.8 ± 0.1	1	P-U	293 ± 21	1
K-K	56.96	1	Mn-Mn	61.6 ± 9.6	1	No-O	268	1	P-W	305 ± 4	1
K-Kr	4.6	1	Mn-O	362 ± 25	1	Np-O	731	1	Pb-Pb	86.6 ± 0.8	1
K-Li	82.0 ± 4.2	1	Mn-S	301 ± 17	1	O-O	498.36 ± 0.17	1	Pb-S	398	1
K-Na	65.994 ± 0.008	1	Mn-Se	239.3 ± 9.2	1	O-Os	575	1	Pb-Sb	161.5 ± 10.5	1
K-Zn	6.5	1	Mo-Mo	435.5 ± 1.0	1	O-P	589	1	Pb-Se	302.9 ± 4.2	1
K-O	271.5 ± 12.6	1	Mo-Nb	452 ± 25	1	O-Pa	792	1	Pb-Si	168.8 ± 7.3	6
K-Rb	53.723 ± 0.005	1	Mo-O	502	1	O-Pb	382.4 ± 3.3	4	Pb-Te	249.8 ± 10.5	1
K-Xe	5.0	1	N-N	944.84 ± 0.10	1	O-Pd	238.1 ± 12.6	1	Pd-Pd	>136	1
Kr-Kr	5.39	1	N-O	631.62 ± 0.18	1	O-Pr	740	1	Pd-Pt	191.0	1
Kr-Li	~12.1	1	N-P	617.1 ± 20.9	1	O-Pt	418.6 ± 11.6	13	Pd-Si	261 ± 12	1
Kr-Mg	6.71 ± 0.96	1	N-Pt	374.2 ± 9.6	1	O-Pu	656.1	1	Pd-Y	241 ± 15	1
Kr-Na	~4.53	1	N-Pu	469 ± 63	1	O-Rb	276 ± 12.6	1	Po-Po	187	1
Kr-Ne	4.31	1	N-S	467 ± 24	1	O-Re	627 ± 84	1	Pr-Pr	129.1	1
Kr-O	<8	1	N-Sb	460 ± 84	1	O-Rh	405 ± 42	1	Pr-S	492.5 ± 4.6	1
Kr-Tl	4.14	1	N-Sc	464 ± 84	1	O-Ru	528 ± 42	1	Pr-Se	446.4 ± 23.0	1
Kr-Xe	5.66	1	N-Si	437.1 ± 9.9	1	O-S	517.90 ± 0.05	1	Pr-Te	326 ± 20	1
Kr-Zn	5.0	1	N-Ta	607 ± 84	1	O-Sb	434 ± 42	1	Pt-Pt	306.7 ± 1.9	1
La-La	244.9	1	N-Th	577 ± 33	1	O-Sc	671.4 ± 1.0	1	Pt-Si	501 ± 18	1
La-N	519 ± 42	1	N-Ti	476 ± 33	1	O-Se	429.7 ± 6.3	1	Pt-Th	551 ± 42	1
La-O	798	1	N-U	531 ± 21	1	O-Si	799.6 ± 13.4	1	Pt-Ti	397.5 ± 10.6	1
La-Pt	505 ± 12	1	N-V	523 ± 38	1	O-Sm	573	1	Pt-Y	474 ± 12	1
La-Rh	550 ± 12	1	N-Xe	26.9	1	O-Sn	528	1	Rb-Rb	48.898 ± 0.005	1
La-S	573.4 ± 1.7	1	N-Y	477 ± 63	1	O-Sr	426.3 ± 6.3	1	Re-Re	432 ± 30	1
La-Se	485.7 ± 14.6	1	N-Zr	565 ± 25	1	O-Ta	839	1	Rh-Rh	235.85 ± 0.05	1
La-Te	385.6 ± 15	1	Na-Na	74.805 ± 0.586	1	O-Tb	694	1	Rh-Sc	444 ± 11	1
La-Y	197 ± 21	1	Na-Ne	~3.8	1	O-Tc	548	1	Rh-Si	395.0 ± 18.0	1
Li-Li	105.0	1	Na-O	270 ± 4	1	O-Te	377 ± 21	1	Rh-Th	513 ± 21	1
Li-Mg	67.4 ± 6.3	1	Na-Rb	63.887 ± 0.024	1	O-Th	877	1	Rh-Ti	390.8 ± 14.6	1
Li-Na	87.181 ± 0.001	1	Na-Xe	~5.12	1	O-Ti	666.5 ± 5.6	1	Rh-U	519 ± 17	1
Li-O	340.5 ± 6.3	1	Nb-Nb	513	1	O-Tl	213 ± 84	1	Rh-V	364 ± 29	1
Li-Pb	78.7 ± 8	1	Nb-Ni	271.9 ± 0.1	1	O-Tm	514	1	Rh-Y	446 ± 11	1
Li-S	312.5 ± 7.5	1	Nb-O	726.5 ± 10.6	1	O-U	755	1	Ru-Ru	193.0 ± 19.3	1
Li-Sb	169.0 ± 10.0	1	Nb-Ti	302.0 ± 0.1	1	O-V	637	1	Ru-Si	397.1 ± 21	1
Li-Si	149	1	Nb-V	369.3 ± 0.1	1	O-W	720 ± 71	1	Ru-Th	592 ± 42	1
Li-Sm	193.3 ± 18.8	1	Nd-Nd	82.8	1	O-Xe	36.4	1	Ru-V	414 ± 29	1
Li-Tm	276.1 ± 14.6	1	Nd-O	703	1	O-Y	714.1 ± 10.2	1	S-S	425.30	1
Li-Xe	~12.1	1	Nd-S	471.5 ± 14.6	1	O-Yb	387.7 ± 10	1	S-Sb	378.7	1
Li-Yb	143.5 ± 12.6	1	Nd-Se	393.9	1	O-Zn	≤250	1	S-Sc	478.2 ± 12.6	1

A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.	A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.	A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.	A-B	$D^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.
S-Se	371.1 ± 6.7	1	Sb-Tl	126.7 ± 10.5	1	Si-Te	429.2	3	Ti-Ti	117.6	1
S-Si	617 ± 5	1	Sc-Sc	163 ± 21	1	Si-Y	258 ± 17	1	Ti-V	203.2 ± 0.1	1
S-Sm	389	1	Sc-Se	385 ± 17	1	Sm-Sm	54 ± 21	1	Ti-Zr	214.3 ± 0.1	1
S-Sn	467	1	Sc-Si	227.2 ± 14	1	Sm-Te	272.4 ± 14.6	1	Tl-Tl	59.4	1
S-Sr	338.5 ± 16.7	1	Sc-Te	289 ± 17	1	Sn-Sn	187.1 ± 0.3	1	Tl-Xe	4.18	1
S-Ta	669.5 ± 13.5	1	Se-Se	330.5	1	Sn-Te	338.1 ± 6.3	1	Tm-Tm	54 ± 17	1
S-Tb	515 ± 42	1	Se-Si	538 ± 13	1	Sr-Sr	16.64 ± 1.12	1	U-U	222 ± 21	1
S-Te	335 ± 42	1	Se-Sm	331.0 ± 14.6	1	T-T	446.67	1	V-V	269.3 ± 0.1	1
S-Ti	418 ± 3	1	Se-Sn	401.2 ± 5.9	1	Ta-Ta	390 ± 96	1	V-Zr	260.6 ± 0.3	1
S-Tm	368 ± 21	1	Se-Sr	251.0 ± 12.6	1	Tb-Tb	138.8	1	W-W	666	1
S-U	528.4 ± 10.5	1	Se-Tb	423 ± 20	1	Tb-Te	339 ± 42	1	Xe-Xe	6.023	1
S-V	449.4 ± 14.6	1	Se-Te	293.3	1	Tc-Tc	330	1	Y-Y	~270 ± 39	1
S-Y	528.4 ± 10.5	1	Se-Ti	381 ± 42	1	Te-Te	257.6 ± 4.1	1	Yb-Yb	16.3	1
S-Yb	167	1	Se-Tm	274 ± 40	1	Te-Ti	289 ± 17	1	Zn-Zn	22.2 ± 6.3	1
S-Zn	224.8 ± 12.6	1	Se-V	347 ± 21	1	Te-Tm	182 ± 40	1	Zr-Zr	298.2 ± 0.1	1
S-Zr	572.0 ± 11.6	1	Se-Y	435 ± 13	1	Te-Y	339 ± 13	1			
Sb-Sb	301.7 ± 6.3	1	Se-Zn	170.7 ± 25.9	1	Te-Zn	117.6 ± 18.0	1			
Sb-Te	277.4 ± 3.8	1	Si-Si	310	1	Th-Th	≤289 ± 33	1			

References

1. Luo, Y. R. *Comprehensive Handbook of Chemical Bond Energies*, CRC Press, Boca Raton, FL, 2007.

2. Hildenbrand, D. L., and Lau, K.H., *J. Phys. Chem. A* 110, 11886, 2006.

3. Chattopadhyaya, S., Pramanik, A., Banerjee, A., and Das, K. K., *J. Phys. Chem. A* 110, 12303, 2006.

4. Brutti, S., Balducci, G., and Gigli, G., *Rapid Commun. Mass Spectrom.* 21, 89, 2007.

5. Staunum, P., Pashov, A., Knöckel, H., and Tiemann, E., *Phys. Rev. A* 75, 042513, 2007.

6. Ciccioli, A., Gigli, G., Meloni, G., and Testani, E., *J. Chem. Phys.* 127, 054303/1, 2007.

7. Nagarajan, R., and Morse, M. D., *J. Chem. Phys.* 127, 074304/1, 2007.

8. Li, J., Hao, Y., Yang, J., Zhou, C., and Mo, Y., *J. Chem. Phys.* 127, 104307/1, 2007.

9. Armentrout, P. B., *Organometallics* 26, 5473, 2007.

10. Shayesteh, A., Henderson, R. D. E., Le Roy, R. J., and Bernath, P. F., *J. Phys. Chem. A* 111, 12495, 2007.

11. Hildenbrand, D. H., *J. Phys. Chem. A* 112, 3813, 2008.

12. Dooley, K. S., Geidosch, J. N., and North, S. W., *Chem. Phys. Lett.* 457, 303, 2008.

13. Citir, M., Metz, R. B., Belau, L., and Ahmed, M., *J. Phys. Chem. A* 112, 9584, 2008.

14. Hildenbrand, D. L., Lau, K. H., Perez-Mariano, J., and Sanjurjo, A., *J. Phys. Chem. A* 112, 9978, 2008.

15. Gibson, J. K., Haire, R. G., Santos, M., Pires de Matos, A., and Marçalo, J., *J. Phys. Chem. A* 112, 11373, 2008.

TABLE 2. Enthalpy of Formation of Gaseous Atoms

Atom	$\Delta_f H^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.	Atom	$\Delta_f H^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.	Atom	$\Delta_f H^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.	Atom	$\Delta_f H^{\circ}_{298}/\text{kJ mol}^{-1}$	Ref.
Ac	406	5	Cr	397.48 ± 4.2	3	La	431.0 ± 2.1	4	Pu	345	6
Ag	284.9 ± 0.8	2	Cs	76.5 ± 1.0	2	Li	159.3 ± 1.0	2	Ra	159	5
Al	330.9 ± 4.0	2	Cu	337.4 ± 1.2	2	Lu	427.6 ± 2.1	4	Rb	80.9 ± 0.8	2
Am	284	6	Dy	290.4 ± 2.1	4	Mg	147.1 ± 0.8	2	Re	774 ± 6.3	1
As	302.5 ± 13	1	Er	316.4 ± 2.1	4	Mn	283.3 ± 4.2	3	Rh	556 ± 4	1
Au	368.2 ± 2.1	1	Es	133	6	Mo	658.98 ± 3.8	3	Ru	650.6 ± 6.3	1
B	565 ± 5	2	Eu	177.4 ± 2.1	4	N	472.68 ± 0.40	2	S	277.17 ± 0.15	2
Ba	179.1 ± 5.0	3	F	79.38 ± 0.30	2	Na	107.5 ± 0.7	3	Sb	264.4 ± 2.5	1
Be	324 ± 5	2	Fe	415.5 ± 1.3	3	Nb	733.0 ± 8	3	Sc	377.8 ± 4	1
Bi	209.6 ± 2.1	1	Ga	271.96 ± 2.1	3	Nd	326.9 ± 2.1	4	Se	227.2 ± 4	1
Bk	310	6	Gd	397.5 ± 2.1	4	Ni	430.1 ± 8.4	3	Si	450.0 ± 8	2
Br	111.87 ± 0.12	3	Ge	372 ± 3	2	Np	464.8	6	Sm	206.7 ± 2.1	4
C	716.68 ± 0.45	2	H	217.998 ± 0.006	2	O	249.229 ± 0.002	7	Sn	301.2 ± 1.5	2
Ca	177.8 ± 0.8	2	Hf	618.4 ± 6.3	3	Os	787 ± 6.3	1	Sr	164.0 ± 1.7	3
Cd	111.80 ± 0.20	2	Hg	61.38 ± 0.04	2	P	316.5 ± 1.0	2	Ta	782.0 ± 2.5	1
Ce	420.1 ± 2.1	4	Ho	300.6 ± 2.1	4	Pa	563	5	Tb	388.7 ± 2.1	4
Cf	196	6	I	106.76 ± 0.04	2	Pb	195.2 ± 0.8	2	Tc	678	5
Cl	121.301 ± 0.008	2	In	243 ± 4	1	Pd	376.6 ± 2.1	1	Te	196.6 ± 2.1	1
Cm	386	6	Ir	669 ± 4	1	Pr	356.9 ± 2.1	4	Th	602 ± 6	2
Co	426.7	3	K	89.0 ± 0.8	2	Pt	565.7 ± 1.3	1	Ti	473 ± 3	2

Atom	$\Delta_f H^\circ_{298}/\text{kJ mol}^{-1}$	Ref.	Atom	$\Delta_f H^\circ_{298}/\text{kJ mol}^{-1}$	Ref.	Atom	$\Delta_f H^\circ_{298}/\text{kJ mol}^{-1}$	Ref.	Atom	$\Delta_f H^\circ_{298}/\text{kJ mol}^{-1}$	Ref.
Tl	182.2 ± 0.4	1	U	533 ± 8	2	W	851.0 ± 6.3	3	Yb	155.6 ± 2.1	4
Tm	232.2 ± 2.1	4	V	515.5 ± 8	3	Y	424.7 ± 2.1	4	Zn	130.40 ± 0.40	2
									Zr	610.0 ± 8.4	3

References

1. Brewer, L., and Rosenblatt, G. M., *Adv. High Temp. Chem.* 2, 1, 1969.
2. Cox, J. D., Wagman, D. D., and Medvedev, V. A., Eds., *CODATA Key Values for Thermodynamics*, Hemisphere Publishing Corporation, New York, 1989; updated e-version: <http://www.codata.org/codata>.
3. NIST Chemistry WebBook, <http://webbook.nist.gov>, *NIST-JANAF Thermochemical Table*, 4th Edn., Chase, Jr., M. W., Ed., ACS, AIP, New York, 1998.
4. Chandrasekharaiah, M.S., and Gingerich, K.A., Thermodynamic properties of gaseous species, in *Handbook on the Chemistry and Physics of Rare Earths*, Gschneidner, Jr., K.A., and Eyring, L., Eds., Elsevier, Amsterdam, 1989, Vol. 12, Chap. 86, pp. 409–431.
5. Lias, S.G., Bartmess, J. E., Liebman, J. F., Holmes, J. L., Levin, R. D., and Mallard, W. G., *J. Phys. Chem. Ref. Data* 17, Suppl. 1, 1988.
6. Kleinschmidt, P.D., Ward, J. W., Matlack, G. M., and Haire, R. G., *High Temp. Sci.* 19, 267, 1985.
7. Ruscic, B., Pinzon, R.E., Morton, M. E., Srinivasan, N. K., Su, M.-C., Sutherland, J. W., and Michael, J. V., *J. Phys. Chem. A* 110, 6592, 2006.

TABLE 3. Bond Dissociation Energies in Polyatomic Molecules

The D°_{298} values in polyatomic molecules are notoriously difficult to measure accurately since the mechanism of the kinetic systems involved in many of the measurements are seldom straightforward. Thus, much lively controversy has taken place in the literature and is likely to continue for some time to come. We will continue updating and presenting our assessment of the most reliable BDE data every year.

The references relating to each of the D°_{298} values listed in Table 3 are contained in the *Comprehensive Handbook of Chemical Bond Energies*, by Yu-Ran Luo, CRC Press, 2007. Many D°_{298} in Table 3 are derived from the equation

$$D^\circ_{298}(\text{R-X}) = \Delta_f H^\circ(\text{R}) + \Delta_f H^\circ(\text{X}) - \Delta_f H^\circ(\text{RX})$$

Here, the enthalpies of formation of the atoms and radicals are taken from Tables 2 and 4, respectively, and the enthalpies of formation of the molecules are from reference sources listed in the above *Comprehensive Handbook of Chemical Bond Energies*.

Table 3 presents **H-C**, **C-C**, **C-halogen**, **O-**, **N-**, **S-**, **Si-**, **Ge-**, **Sn-**, **Pb-**, **P-**, **As-**, **Sb-**, **Bi-**, **Se-**, **Te-**, and **metal-X** BDEs. The **boldface** in the species indicates the dissociated fragment. The **metal-X** BDEs are arranged on the basis of the Periodic Table with the new IUPAC notation for Groups 1 to 18, see inside front cover of this *Handbook*.

Bond	$D^\circ_{298}/\text{kJ mol}^{-1}$	Ref.	Bond	$D^\circ_{298}/\text{kJ mol}^{-1}$	Ref.	Bond	$D^\circ_{298}/\text{kJ mol}^{-1}$	Ref.
(1) C-H BDEs			$\text{CH}_2=\text{CHCCCH}_2\text{-H}$	363.3	1	H-cyclo-C₅H₉	400.0 ± 4.2	1
$\text{CH}_3\text{-H}$	439.3 ± 0.4	1	$\text{CH}_3\text{CCCH}_2\text{CH}_3$	365.3 ± 9.6	1	H-cyclo-C₆H₁₁	416.3	1
$\text{CH}_3\text{CH}_2\text{-H}$	420.5 ± 1.3	1	$\text{HCCCH}_2\text{CH}_2\text{CH}_3$	349.8 ± 8.4	1	H-C₆H₅	472.2 ± 2.2	1
$\text{CH}_3\text{CH}_2\text{CH}_2\text{-H}$	422.2 ± 2.1	1	$\text{HCCCH}(\text{CH}_3)_2$	345.2 ± 8.4	1	H-CH₂C₆H₅	375.5 ± 5.0	1
$\text{CH}_3\text{CH}_2\text{CH}_3$	410.5 ± 2.9	1	$\text{CH}_3\text{CCCH}(\text{CH}_3)_2$	344.3 ± 11.3	1	H-CH(CH₃)C₆H₅	357.3 ± 6.3	1
$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{-H}$	421.3	1	HCCCCC-H	~543 ± 13	1	H-CH(C₆H₅)₂	353.5 ± 2.1	1
$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$	411.1 ± 2.2	1	$\text{H}_2\text{C=CH-H}$	464.2 ± 2.5	1	H-CH(C₆H₄-p-OH)₂	375.8 ± 4.7	1
$(\text{CH}_3)_2\text{CHCH}_2\text{-H}$	419.2 ± 4.2	1	$\text{CH}_2=\text{C=CH-H}$	371.1 ± 12.6	1	H-C(CH₃)₂C₆H₅	348.1 ± 4.2	1
$(\text{CH}_3)_3\text{C-H}$	400.4 ± 2.9	1	$\text{CH}_3\text{CH=CH-H}$	464.8	1	H-C(C₆H₅)₃	338.9 ± 8.4	1
$(\text{CH}_3)_3\text{CCH}_2\text{-H}$	419.7 ± 4.2	1	$\text{CH}_2=\text{CHCH}_2\text{-H}$	369 ± 3	1	1-H-C₁₀H₇	469.4 ± 5.4	1
$(\text{CH}_3\text{CH}_2)\text{CH}(\text{CH}_3)_2$	400.8	1	$\text{CH}_2=\text{CH-CH}_2\text{CH}_2\text{-H}$	410.5	1	2-H-C₁₀H₇	468.2 ± 5.9	1
$\text{CH}_3\text{CH}_2(\text{CH}_2)_2\text{CH}_3$	415.1	1	$\text{CH}_2=\text{CHCH}_2\text{CH}_3$	350.6	1	H-CF₃	445.2 ± 2.9	1
$(\text{C}_3\text{H}_7)\text{CH}(\text{CH}_3)_2$	396.2 ± 8.4	1	$\text{CH}_2=\text{C}(\text{CH}_3)\text{CH}_2\text{-H}$	372.8	1	H-CHF₂	431.8 ± 4.2	1
$\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}(\text{CH}_3)_2$	399.2 ± 13.0	1	$\text{CH}_2=\text{CHCH=CHCH}_2\text{-H}$	347.3 ± 12.6	1	H-CH₂F	423.8 ± 4.2	1
$\text{CH}_3\text{CH}_2(\text{CH}_2)_3\text{CH}_3$	410	1	$(\text{CH}_2=\text{CH})_2\text{CH-H}$	320.5 ± 4.2	1	H-CClF₂	421.3 ± 8.4	1
$\text{CH}_3\text{CH}_2(\text{CH}_2)_4\text{CH}_3$	410	1	$\text{CH}_2=\text{CHCH}_2\text{CH}_2\text{CH}_3$	348.8	1	H-CCl₂F	410.9 ± 8.4	1
HCC-H	557.81 ± 0.30	1	$\text{CH}_2=\text{CHCH}(\text{CH}_3)_2$	332.6 ± 7.1	1	H-CBrF₂	415.5 ± 12.6	1
HCCCC-H	539 ± 12	1	$\text{CH}_2=\text{C}(\text{CH}_3\text{CH}_2)\text{CH}_2\text{-H}$	356.1 ± 8.4	1	H-CHClF	421.7 ± 10.0	1
CHCCH₂-H	384.1 ± 4.2	1	$(\text{CH}_2=\text{CH})_2\text{C}(\text{CH}_3)\text{-H}$	322.2	1	H-CCl₃	392.5 ± 2.5	1
$\text{CH}_3\text{CCCH}_2\text{-H}$	379.5	1	H-cyclo-C₃H₅	444.8 ± 1.0	1	H-CHCl₂	400.6 ± 2.0	1
HCCCH₂CH₃	373.0	1	H-CH₂-cyclo-C₃H₅	407.5 ± 6.7	1	H-CH₂Cl	419.0 ± 2.3	1
			H-cyclo-C₄H₇	409.2 ± 1.3	1	H-CFClBr	413 ± 21	1

Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.
H-CHClBr	406.0 ± 2.4	1	(CH ₂ OH) ₂	385.3	1	Me ₂ CHC(O)OEt	387.4	1
H-CCl ₂ Br	387 ± 21	1	HOCH ₂ (CH ₂) ₂	399.2	1	PhCHMe(C(O)OEt)	358.2	1
H-CClBr ₂	371 ± 21	1	(OH)CH-H			H-furaylmethyl	361.9 ± 8.4	1
H-CBr ₃	399.2 ± 8.4	1	CH ₃ OCH ₃	402.1	1	CH ₃ NH ₂	392.9 ± 8.4	1
H-CHBr ₂	412.6 ± 2.7	3	CHF ₂ OCF ₃	443.5 ± 4.2	1	CH ₃ N=CH ₂	407.9 ± 14.6	1
H-CH ₂ Br	427.2 ± 2.4	1	CHF ₂ OCHF ₂	435.1 ± 4.2	1	CH ₃ CH ₂ NH ₂	377.0 ± 8.4	1
H-Cl ₃	423 ± 29	1	CH ₃ OCF ₃	426.8 ± 4.2	1	C ₂ H ₅ CH ₂ NH ₂	380.7 ± 8.4	1
H-CHI ₂	431.0 ± 8.4	1	CH ₃ OCH ₂ CH ₃	389.1	1	C ₃ H ₇ CH ₂ NH ₂	393.3 ± 8.4	1
H-CH ₂ I	431.6 ± 2.8	1	(CH ₃) ₃ COC(CH ₃) ₃	402.1	1	C ₄ H ₉ CH ₂ NH ₂	387.7 ± 8.4	1
CF ₃ CF ₂ -H	429.7 ± 2.1	1	CH ₃ CH ₂ OCH ₂ CH ₃	389.1	1	HOCH ₂ CH ₂ NH ₂	379.5 ± 8.4	1
CHF ₂ CF ₂ -H	431.0 ± 18.8	1	CH ₃ CH ₂ Ot-C(CH ₃) ₃	405.4	1	(CH ₃ CH ₂) ₂ NH	370.7 ± 8.4	1
CH ₂ FCF ₂ -H	433.0 ± 14.6	1	CH ₃ OPh	385.0	1	(C ₃ H ₇ CH ₂) ₂ NH	379.9 ± 8.4	1
CHF ₂ CFH-H	426.8 ± 14.6	1	H-2-oxiran-2-yl	420.5 ± 6.5	1	(C ₄ H ₉ CH ₂) ₂ NH	384.5 ± 8.4	1
CF ₃ CH ₂ -H	446.4 ± 4.5	1	H-tetrahydrofuran-2-yl	385.3 ± 6.7	1	(C ₂ H ₅) ₂ NCH ₂ CH ₃	379.5 ± 1.7	1
CH ₃ CF ₂ -H	416.3 ± 4.2	1	HC(O)-H	368.40 ± 0.67	1	(C ₂ H ₅ CH ₂) ₃ N	376.6 ± 8.4	1
CH ₂ FCHF-H	413.4 ± 12.6	1	FC(O)-H	423.0	1	((CH ₃) ₂ CCH ₂) ₃ N	388.3 ± 8.4	1
CHF ₂ CH ₂ -H	433.0 ± 14.6	1	CH ₃ C(O)-H	374.0 ± 1.3	1	(Bu) ₂ NCH ₂ (nPr)	381 ± 10.0	1
CH ₂ FCH ₂ -H	433.5 ± 8.4	1	CF ₃ C(O)-H	390.4	1	((CH ₃) ₂ CH) ₃ N	387.0 ± 8.4	1
CH ₃ CHF-H	410.9 ± 8.4	1	C ₂ H ₅ C(O)-H	374.5	1	(CH ₃) ₂ CHNH ₂	372.0 ± 8.4	1
CF ₃ CHCl-H	425.9 ± 6.3	1	CH ₂ =CHC(O)-H	372.8	1	CH ₃ NHCH ₃	364.0 ± 8.4	1
CF ₃ CClBr-H	404.2 ± 6.3	1	C ₃ H ₇ C(O)-H	371.2	1	(CH ₃) ₃ N	380.7 ± 8.4	1
CClF ₂ CHF-H	412.1 ± 2.1	1	<i>iso</i> -C ₃ H ₇ C(O)-H	364.5	1	<i>tert</i> -BuN(CH ₃) ₂	376.6 ± 8.4	1
CCl ₃ CCl ₂ -H	397.5 ± 8.4	1	C ₄ H ₉ C(O)-H	372.0	1	((HOCH ₂ CH ₂) ₂ (CH ₃))N	364.4 ± 8.4	1
CHCl ₂ CCl ₂ -H	393.3 ± 8.4	1	(CH ₃) ₂ CHCH ₂ C(O)-H	362.5	1	(HOCH ₂ CH ₂) ₃ N	379.9 ± 8.4	1
CH ₃ CCl ₂ -H	397.9 ± 5.0	1	C ₂ H ₅ CH(CH ₃)C(O)-H	360.8	1	((HOCH ₂)CH(CH ₃)) ₃ N	379.9 ± 8.4	1
CH ₃ CHCl-H	406.6 ± 1.5	1	<i>tert</i> -BuC(O)-H	375.1	1	PhCH ₂ NH ₂	368.2	1
CH ₂ ClCH ₂ -H	423.1 ± 2.4	1	EtCHC(O)-H	367.2	1	PhN(CH ₂ CH ₃) ₂	383.3 ± 4.2	1
CH ₃ CBr ₂ -H	397.1 ± 5.0	1	CH ₃ (CH ₂) ₈ C(O)-H	373.3	1	Ph ₂ NCH ₃	379.5 ± 1.7	1
CH ₂ BrCH ₂ -H	415.1 ± 8.4	1	C ₆ H ₅ C(O)-H	371.1 ± 10.9	1	PhN(CH ₂ Ph) ₂	357.3 ± 8.8	1
CH ₃ CHBr-H	415.0 ± 2.7	3	PhCH ₂ C(O)-H	362.0	1	N(CH ₂ Ph) ₃	372.8 ± 2.5	1
CF ₂ =CF-H	464.4 ± 8.4	1	PhC(CH ₃) ₂ C(O)-H	362.9	1	PhN(CH ₂ CH=CH ₂) ₂	339.3 ± 2.9	1
CF ₃ CF ₂ CF ₂ -H	432.2	1	H-CH=C=O	448.1	1	N(CH ₂ CH=CH ₂) ₃	345.6 ± 3.3	1
CH ₃ CH ₂ CHCl-H	407.0 ± 3.5	1	CH ₃ C(O)H	394.5 ± 9.2	1	H ₂ NNH(CH ₃)	410	1
CH ₂ =CH-CHF-H	370.7 ± 4.6	1	CH ₃ C(O)Cl	≤423.4	1	HNN(CH ₃) ₂	410	1
CH ₂ =CHCHCl-H	370.7 ± 4.6	1	CH ₃ CH ₂ C(O)H	383.7	1	(CH ₃) ₂ NC ₆ H ₅	383.7 ± 5.4	1
CH ₂ =CHCHBr-H	374.0 ± 4.6	1	CH ₃ COCH ₃	401.2 ± 2.9	1	H-CN	528.5 ± 0.8	1
H-C ₆ F ₅	487.4	1	CF ₃ C(O)CH ₃	465.6	1	CH ₃ CN	405.8 ± 4.2	1
H-CH ₂ OH	401.92 ± 0.63	1	CH ₃ COCH ₂ CH ₃	403.8	1	CH ₃ CH ₂ CN	393.3 ± 12.6	1
CH ₂ CHOH	467 ± 11	1	MeCOCH ₂ Me	386.2 ± 7.1	1	PhCH ₂ CN	344.3	1
CH ₃ CH ₂ OH	401.2 ± 4.2	1	EtCOCH ₂ Me	396.5 ± 2.8	1	C ₆ F ₅ CH ₂ CN	350.6	1
CH ₃ CH ₂ OH	421.7 ± 8	1	CH ₃ CH ₂ COC ₆ H ₅	402.8 ± 3.6	1	CH ₂ (CN) ₂	366.5	1
CH ₃ CH ₂ CH ₂ OH	392	1	MeCH ₂ COPh	388.7	1	CH ₂ (CN)(NH ₂)	355.2	1
CH ₃ CH ₂ CH ₂ OH	394.6 ± 8.4	1	H-C(O)OH	404.2	1	(CH ₃) ₂ CHCN	384.5	1
CH ₃ CH ₂ CH ₂ OH	406.3 ± 8.4	1	CH ₃ C(O)OH	398.7 ± 12.1	1	CH ₃ NC	389.1 ± 12.6	1
(CH ₃) ₂ CHOH	383.7 ± 8.4	1	ClCH ₂ C(O)OH	398.9	1	H-HCNN	405.8 ± 8.4	1
(CH ₃) ₂ CHOH	394.6 ± 8.4	1	H-C(O)OCH ₃	399.2 ± 8.4	1	H-CNN	331 ± 17	1
CH ₂ =CHCH ₂ OH	341.4 ± 7.5	1	CH ₃ C(O)OCH ₃	406.3 ± 10.5	1	CH ₃ NO ₂	415.4	1
(CH ₃) ₃ COH	418.4 ± 8.4	1	CH ₃ C(O)OCH ₃	404.6	1	CH ₃ CH ₂ NO ₂	410.5	1
(CH ₂ =CH) ₂ CHOH	288.7	1	CH ₃ C(O)OCH ₂ CH ₃	401.7	1	C ₂ H ₅ CH ₂ NO ₂	410.5	1
Ph ₂ CHOH	326	1	CH ₃ C(O)OPh	419.2 ± 5.4	1	Me ₂ CHNO ₂	394.9	1
CH ₃ CH(OH) ₂	~385	1	CH ₃ CH ₂ C(O)OEt	400	1	C ₆ H ₅ C(NO ₂)CHCH ₃	357.3	1
			PhCH ₂ C(O)OEt	370.7	1			

Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.
H-C(S)H	399.6 ± 5.0	1	CH ₃ -CHCH ₂	426.3 ± 6.3	1	CCl ₃ -CH ₂ Cl	323.8 ± 8.4	1
CH ₃ SH	392.9 ± 8.4	1	CH ₃ -CH=CCH ₂	359.8 ± 5.9	1	CCl ₃ -CH ₃	362.3 ± 6.3	1
CH ₃ SCH ₃	392.0 ± 5.9	1	CH ₃ -cyclopro-en-1-yl	340.6 ± 20.9	1	CHCl ₂ -CHCl ₂	326.9 ± 4.1	1
PhSCH ₃	389.1	1	CH ₃ -CH ₂ CH=CH ₂	317.6 ± 3.8	1	CHCl ₂ -CH ₂ Cl	352.2 ± 5.9	1
PhCH ₂ SPh	352.3	1	CH ₃ -CH ₂ C(CH ₃)=CH ₂	310.0 ± 4.2	1	CHCl ₂ -CH ₃	361.3 ± 2.5	1
(PhS) ₂ CHPh	341.0	1	CH ₃ -CH(CH ₃)CH=CH ₂	302.5 ± 6.3	1	CHBrCl-CH ₃	384.5	1
PhSCHPh ₂	344.8	1	CH ₃ -C(CH ₃) ₂ CH=CH ₂	282.4 ± 6.3	1	CHClBr-CHClBr	317.1 ± 12.6	1
CH ₃ SOCH ₃	393.3	1	CH ₃ -cyclo-C ₅ H ₇	299.2 ± 8.4	1	CH ₂ Cl-CH ₂ Cl	360.7 ± 8.4	1
CH ₃ SO ₂ CH ₃	414.2	1	CH ₃ -C ₆ H ₅	426.8 ± 4.2	1	CH ₂ Cl-CH ₃	375.7 ± 9.2	1
CH ₃ SO ₂ CF ₃	431.0	1	HCC-C ₆ H ₅	590.8 ± 5.9	1	Br ₃ C-CH ₃	356.9 ± 12.6	1
CH ₃ SO ₂ Ph	414.2	1	C ₂ H ₅ -C ₆ H ₅	482.0 ± 5.4	1	Br ₃ C-CBr ₃	278.7 ± 16.7	1
PhCH ₂ SO ₂ Me	380.7	1	CH ₃ -CH ₂ C ₆ H ₅	325.1 ± 4.2	1	CHBr ₂ -CH ₃	372.8	1
PhCH ₂ SO ₂ CF ₃	372.4	1	CH ₃ -CH(CH ₃)C ₆ H ₅	318.8 ± 8.4	1	CH ₂ Br-CH ₂ Cl	378.2	1
PhCH ₂ SO ₂ tBu	376.6	1	CH ₃ -C(CH ₃) ₂ C ₆ H ₅	303.3 ± 8.4	1	CH ₂ Br-CH ₂ Br	379.9 ± 8.4	1
Ph ₂ CHSO ₂ Ph	365.3	1	CH ₃ -CH ₂ CHCHPh	295.4	1	CH ₂ I-CH ₂ I	387.0 ± 10.5	1
CH ₂ (SPh) ₂	372.4	1	CH ₃ -CH(C ₆ H ₅) ₂	315.9 ± 6.3	1	CH ₃ -CH ₂ Br	381.6 ± 8.4	1
H-CH ₂ SiMe ₃	418 ± 6.3	1	CH ₃ -C(CH ₃)(C ₆ H ₅) ₂	290.8 ± 8.4	1	CH ₃ -CH ₂ I	384.5 ± 8.4	1
H-CH ₂ C(CH ₃) ₂ SiMe ₃	409 ± 5	1	C ₆ H ₅ -C ₆ H ₅	478.6 ± 6.3	1	CF ₃ -CF ₂ CF ₃	424.3 ± 13.6	1
H-CH ₂ SiMe ₂ Ph	410.1	1	C ₆ H ₅ -CH ₂ C ₆ H ₅	383.7 ± 8.4	1	CF ₃ -CF=CF ₂	420.5	1
H-CH((CH ₃) ₃ Si) ₂	397 ± 13	1	C ₆ H ₅ CH ₂ -CH ₂ C ₆ H ₅	272.8 ± 9.2	1	CH ₃ -CH ₂ CH ₂ Cl	371.4 ± 2.8	1
H-CH ₂ B(RO) ₂	412.5	1	C ₆ H ₅ -CH(C ₆ H ₅) ₂	361.1 ± 8.4	1	CH ₃ -CHClCH ₃	367.5 ± 2.0	1
H-CH((CH ₃) ₂ P) ₂	385 ± 13	1	C ₆ H ₅ -C(C ₆ H ₅) ₃	324.3 ± 12.6	1	CH ₂ Cl-CHClCH ₃	356.5 ± 8.4	1
(2) C-C BDEs			Ph ₂ CH-CHPh ₂	247.3 ± 8.4	1	CH ₂ Cl-CH ₂ CClH ₂	369.0 ± 8.4	1
CH ₃ -CH ₃	377.4 ± 0.8	1	PhCH ₂ -CPh ₃	234.7 ± 14.6	1	CH ₃ -CCl ₂ CH ₃	362.8 ± 8.4	1
CH ₃ -C ₂ H ₅	370.3 ± 2.1	1	R-R, π-dimer, R = phenalenyl	42	1	CH ₂ Br-CHBrCH ₃	369.4 ± 8.4	1
CH ₃ -C ₃ H ₇	372.0 ± 2.9	1	R-R, σ-dimer, R = phenalenyl	42.7	1	CH ₂ ClCH ₂ -CHClCH ₃	364.4 ± 8.4	1
CH ₃ -iso-C ₃ H ₇	369.0 ± 3.8	1	R-R, R = 9-phenylfluorenyl	63.6	1	CH ₂ ClCH ₂ -CH ₂ CClH ₂	369.0 ± 8.4	1
CH ₃ -C ₄ H ₉	371.5 ± 2.9	1	CF ₃ -CF ₃	413.0 ± 5.0	1	CH ₃ CHBr-CHBrCH ₃	355.6 ± 8.4	1
CH ₃ -iso-C ₄ H ₉	370.3 ± 4.6	1	CF ₃ -CHF ₂	399.6 ± 8.4	1	CF ₃ -C ₆ H ₅	463.2 ± 12.6	1
CH ₃ -sec-C ₄ H ₉	368.2 ± 2.9	1	CF ₃ -CClF ₂	373.6 ± 12.5	1	CCl ₃ -C ₆ H ₅	388.7 ± 8.4	1
CH ₃ -tert-C ₄ H ₉	363.6 ± 2.9	1	CF ₃ -CH ₂ F	397.5 ± 8.4	1	CH ₃ -C ₆ F ₅	439.3	1
CH ₃ -C ₅ H ₁₁	368.4 ± 6.3	1	CF ₃ -CCl ₃	332.2 ± 5.4	1	CF ₃ -C ₆ F ₅	435.1	1
CH ₃ -CH(C ₂ H ₅) ₂	365.7 ± 4.2	1	CF ₃ -CHBrCl	377.0 ± 10.5	1	CF ₃ -CH ₂ C ₆ H ₅	365.7 ± 12.6	1
CH ₃ -C(CH ₃) ₂ (CH ₂ CH ₃)	360.9 ± 6.3	1	CF ₃ -CH ₂ Br	399.6 ± 8.4	1	C ₆ F ₅ -C ₆ F ₅	488.3	1
CH ₃ -C ₆ H ₁₃	368.2 ± 6.3	1	CF ₃ -CH ₂ I	408.4 ± 10.5	1	CF ₃ -CHPh ₂	352.3 ± 16.7	1
C ₂ H ₅ -C ₂ H ₅	363.2 ± 2.5	1	CF ₃ -CH ₃	429.3 ± 5.0	1	CF ₃ -CPh ₃	290.8 ± 16.7	1
C ₃ H ₇ -C ₃ H ₇	366.1 ± 3.3	1	CHF ₂ -CHF ₂	382.4 ± 15.5	1	CF ₂ CF-CF ₂	558.1 ± 12.6	1
iso-C ₃ H ₇ -iso-C ₃ H ₇	353.5 ± 4.6	1	CClF ₂ -CClF ₂	378.7 ± 12.6	1	CH ₂ FCH ₂ -CPh ₃	274.9 ± 16.7	1
C ₄ H ₉ -C ₄ H ₉	364.0 ± 3.8	1	CF ₂ Cl-CFCl ₂	358.6 ± 12.6	1	CHF ₂ CH ₂ -CPh ₃	264.0 ± 16.7	1
iso-C ₄ H ₉ -iso-C ₄ H ₉	362.3 ± 6.3	1	CHF ₂ -CH ₂ F	394.1 ± 16.7	1	CH ₃ -CH ₂ OH	364.8 ± 4.2	1
sec-C ₄ H ₉ -sec-C ₄ H ₉	348.5 ± 3.3	1	CH ₂ F-CH ₂ F	368.2 ± 8.4	1	CF ₃ -CH ₂ OH	405.4 ± 6.3	1
tert-C ₄ H ₉ -tert-C ₄ H ₉	322.6 ± 4.2	1	CHF ₂ -CH ₃	405.0 ± 8.4	1	C ₂ H ₅ -CH ₂ OH	356.9 ± 5.0	1
CH ₃ -cyclo-C ₃ H ₉	358.2 ± 5.0	1	CH ₂ F-CH ₃	388.3 ± 8.4	1	C ₃ H ₇ -CH ₂ OH	357.3 ± 3.3	1
CH ₃ -cyclo-C ₆ H ₁₁	377.0 ± 7.5	1	CHClF-CH ₃	399.6 ± 12.6	1	iso-C ₃ H ₇ -CH ₂ OH	354.8 ± 4.2	1
cyclo-C ₆ H ₁₁ -cyclo-C ₆ H ₁₁	369.0 ± 8.4	1	CF ₂ Br-CHClF	369.4	1	C ₄ H ₉ -CH ₂ OH	355.6 ± 4.2	1
CH ₃ -CH ₂ C≡CH	320.5 ± 5.0	1	CF ₂ Br-CH ₃	396.6 ± 15.1	1	sec-C ₄ H ₉ -CH ₂ OH	352.7 ± 4.2	1
CH ₃ -CH ₂ C≡CCH ₃	308.4 ± 6.3	1	CCl ₃ -CCl ₃	285.8 ± 6.3	1	iso-C ₄ H ₉ -CH ₂ OH	354.0 ± 5.4	1
CH ₃ -CH(CH ₃)C≡CH	305.4 ± 8.4	1	CCl ₃ -CClF ₂	282.0 ± 12.6	1	C ₆ H ₅ -CH ₂ OH	413.4 ± 5.4	1
CH ₃ -CH(CH ₃)C≡CCH ₃	320.9 ± 6.3	1	CCl ₃ -CHCl ₂	303.3 ± 6.3	1	HOH ₂ C-CH ₂ OH	358.2 ± 6.3	1
CH ₃ -C(CH ₃) ₂ C≡CH	295.8 ± 6.3	1				NH ₂ CH ₂ -CH ₂ OH	335.6 ± 10.5	1
CH ₃ -C(CH ₃) ₂ C≡CCH ₃	303.3 ± 6.3	1				CH ₃ -CH ₂ OCH ₃	363.2 ± 5.0	1

Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.
$\text{CH}_3\text{OCH}_2\text{---CH}_2\text{OCH}_3$	338.9 ± 10.5	1	$\text{C}_{58}\text{---C}_{21}$	955.2 ± 14.5	1	$\text{Cl---CF}_2\text{CF}_2\text{Cl}$	331.4 ± 20.9	1
$\text{CH}_3\text{---C(O)H}$	354.8 ± 1.7	1	(3) C-halogen BDEs			$\text{Cl---CCl}_2\text{CF}_3$	307.9	1
$\text{CCl}_3\text{---C(O)H}$	309.2 ± 5.0	1	F---CN	482.8	1	$\text{Cl---CCl}_2\text{CCl}_3$	303.8	1
$\text{CH}_3\text{---C(O)F}$	417.6 ± 6.3	1	F---CF_3	546.8 ± 2.1	1	Cl---CHClCCl_3	330.5 ± 4.2	1
$\text{CH}_3\text{---C(O)Cl}$	367.8 ± 6.3	1	F---CHF_2	533.9 ± 5.9	1	$\text{Cl---CCl}_2\text{CHCl}_2$	311.7	1
$\text{CCl}_3\text{---C(O)Cl}$	289.1 ± 6.3	1	$\text{F---CH}_2\text{F}$	496.2 ± 8.8	1	Cl---CHClCH_3	327.9 ± 1.8	1
$\text{CHCl}_2\text{---C(O)Cl}$	312.5 ± 8.4	1	$\text{F---CF}_2\text{Cl}$	511.7	1	$\text{Cl---CH}_2\text{CH}_2\text{Cl}$	345.1 ± 5.0	1
$\text{CClH}_2\text{---C(O)Cl}$	340.2 ± 8.4	1	F---CFCl_2	482.0 ± 10.5	1	Cl---CHBrCH_3	331.8 ± 8.4	1
$\text{C}_6\text{H}_5\text{---C(O)H}$	408.4 ± 4.2	1	F---CHFCl	462.3 ± 10.0	1	$\text{Cl---CH}_2\text{CH}_3$	352.3 ± 3.3	1
$\text{C}_6\text{H}_5\text{---C(O)Cl}$	417.6 ± 6.3	1	F---CCl_3	439.3 ± 4	1	$\text{Cl---CH}_2\text{CH=CH}_2$	298.3 ± 5.0	1
$\text{CH}_3\text{---C(O)CH}_3$	351.9 ± 2.1	1	$\text{F---CH}_2\text{Cl}$	465.3 ± 9.6	1	$\text{Cl---C}_3\text{H}_7$	352.7 ± 4.2	1
$\text{C}_2\text{H}_5\text{---C(O)CH}_3$	347.3 ± 2.9	1	F---CH_3	460.2 ± 8.4	1	$\text{Cl---CH}_2\text{CH}_2\text{CH}_2\text{Cl}$	348.9	1
$\text{C}_3\text{H}_7\text{---C(O)CH}_3$	348.5 ± 2.9	1	$\text{F---C}\equiv\text{CH}$	521.3	1	$\text{Cl---iso-C}_3\text{H}_7$	354.0 ± 6.3	1
<i>iso</i> - $\text{C}_3\text{H}_7\text{---C(O)CH}_3$	340.2 ± 3.8	1	$\text{F---C}\equiv\text{CF}$	519 ± 21	1	$\text{Cl---CH}_2\text{CHCH=CH}_2$	342.7	1
$\text{C}_4\text{H}_7\text{---C(O)CH}_3$	346.9 ± 5.4	1	F---CF=CF_2	546.4 ± 12.6	1	$\text{Cl---C}_4\text{H}_9$	350.6 ± 6.3	1
<i>tert</i> - $\text{C}_4\text{H}_9\text{---C(O)CH}_3$	329.3 ± 4.2	1	$\text{F---CF}_2\text{CF}_3$	532.2 ± 6.3	1	$\text{Cl---sec-C}_4\text{H}_9$	350.2 ± 6.3	1
$\text{C}_6\text{H}_5\text{---C(O)CH}_3$	406.7 ± 4.6	1	$\text{F---CH}_2\text{CF}_3$	457.7	1	$\text{Cl---tert-C}_4\text{H}_9$	351.9 ± 6.3	1
$\text{C}_6\text{H}_5\text{CH}_2\text{---C(O)CH}_3$	299.7 ± 8.4	1	$\text{F---CF}_2\text{CH}_3$	522.2 ± 8.4	1	$\text{CH}_2\text{CHCHCl(CH}_3\text{)}$	300.0 ± 6.3	1
HC(O)---C(O)H	295.8 ± 6.3	1	$\text{F---C}_2\text{H}_3$	517.6 ± 12.6	1	$\text{Cl---C}_5\text{H}_{11}$	350.6 ± 6.3	1
ClC(O)---C(O)Cl	292.5 ± 8.4	1	$\text{F---C}_2\text{H}_5$	467.4 ± 8.4	1	$\text{Cl---C(CH}_3)_2\text{(C}_2\text{H}_5\text{)}$	352.7 ± 6.3	1
$\text{CH}_3\text{C(O)---C(O)H}$	302.5 ± 8.4	1	$\text{F---C}_3\text{H}_7$	474.9 ± 8.4	1	$\text{Cl---cyclo-C}_6\text{H}_{11}$	360.2 ± 6.5	1
$\text{CH}_3\text{C(O)---C(O)CH}_3$	307.1 ± 4.2	1	$\text{F---iso-C}_3\text{H}_7$	483.8 ± 8.4	1	$\text{Cl---C}_6\text{H}_5$	399.6 ± 6.3	1
$\text{C}_6\text{H}_5\text{C(O)---C(O)C}_6\text{H}_5$	288.3 ± 16.7	1	$\text{F---tert-C}_4\text{H}_9$	495.8 ± 8.4	1	$\text{Cl---C}_6\text{F}_5$	383.3 ± 8.4	1
$\text{CH}_3\text{---C(O)OH}$	384.9 ± 8.4	1	$\text{F---C}_6\text{H}_5$	525.5 ± 8.4	1	$\text{Cl---CH}_2\text{C}_6\text{H}_5$	299.9 ± 4.3	1
$\text{CF}_3\text{---C(O)OH}$	370.7 ± 8.4	1	$\text{F---C}_6\text{F}_5$	485 ± 25	1	Cl---C(O)Cl	318.8 ± 8.4	1
$\text{CCl}_3\text{---C(O)OH}$	310.5 ± 12.6	1	$\text{F---CH}_2\text{C}_6\text{H}_5$	412.8 ± 4.2	1	Cl---COF	376.6	1
$\text{CClH}_2\text{---C(O)OH}$	357.7 ± 8.4	1	F---COH	497.9 ± 10.5	1	Cl---C(O)CH_3	354.0 ± 8.4	1
$\text{CH}_2\text{Br---C(O)OH}$	358.2 ± 8.4	1	F---COF	510.3	1	$\text{Cl---C(O)CH}_2\text{CH}_3$	353.3 ± 6.3	1
$\text{NH}_2\text{CH}_2\text{---C(O)OH}$	349.4 ± 8.4	1	F---COCl	484.5	1	$\text{Cl---C(O)C}_6\text{H}_5$	341.0 ± 8.4	1
$\text{CH}_3\text{NHCH}_2\text{---C(O)OH}$	300.4 ± 8.4	1	F---C(O)CH_3	511.7 ± 12.6	1	$\text{Cl---CH}_2\text{C(O)C}_6\text{H}_5$	309	1
$\text{C}_6\text{H}_5\text{---C(O)OH}$	429.7 ± 8.4	1	Cl---CN	422.6 ± 8.4	1	$\text{Cl---CH}_2\text{C(O)OH}$	310.9 ± 2.2	1
$\text{C}_6\text{F}_5\text{---C(O)OH}$	470.0 ± 10.5	1	Cl---CF_3	365.3 ± 3.8	1	$\text{Cl---C(O)OC}_6\text{H}_5$	364	1
$\text{HOCH}_2\text{---C(O)OH}$	371.5 ± 5.4	1	Cl---CHF_2	364 ± 8	1	$\text{Cl---C(NO}_2)_3$	302.1	1
HOC(O)---C(O)OH	334.7 ± 6.3	1	$\text{Cl---CH}_2\text{F}$	354.4 ± 11.7	1	Br---CN	364.8 ± 4.2	1
$\text{CH}_3\text{NHCH}_2\text{---C(O)OH}$	301.2 ± 16.7	1	$\text{Cl---CF}_2\text{Cl}$	333.9 ± 10.5	1	Br---CF_3	296.2 ± 1.3	1
$\text{CH}_3\text{CH(NH}_2\text{)---C(O)OH}$	331.4 ± 16.7	1	Cl---CFCl_2	320.9 ± 8.4	1	Br---CHF_2	288.7 ± 8.4	1
$\text{NH}_2\text{CH}_2\text{---CH}_2\text{C(O)OH}$	325.5 ± 16.7	1	Cl---CHFCl	346.0 ± 13.4	1	$\text{Br---CF}_2\text{Cl}$	269.9 ± 6.3	1
CN---CN	571.9 ± 6.7	1	Cl---CCl_3	296.6	1	Br---CCl_3	231.4 ± 4.2	1
HC(O)---CN	455.2 ± 8.4	1	Cl---CHCl_2	311.1 ± 2.0	1	$\text{Br---CH}_2\text{Cl}$	277.3 ± 3.6	1
HC(S)---CN	530.1 ± 8.4	1	$\text{Cl---CH}_2\text{Cl}$	338.0 ± 3.3	1	Br---CBr_3	242.3 ± 8.4	1
$\text{CF}_3\text{---CN}$	469.0 ± 4.2	1	Cl---CBrCl_2	287 ± 10.5	1	Br---CHBr_2	274.9 ± 13.0	1
$\text{CH}_3\text{---CN}$	521.7 ± 9.2	1	$\text{Cl---CH}_2\text{Br}$	332.8 ± 4.6	1	$\text{Br---CH}_2\text{Br}$	276.1 ± 5.3	1
NCC---CN	462.3	1	$\text{Cl---CH}_2\text{I}$	328.2 ± 6.9	1	$\text{Br---CH}_2\text{I}$	274.5 ± 7.5	1
$\text{C}_2\text{H}_5\text{---CN}$	506.7 ± 7.5	1	Cl---CH_3	350.2 ± 1.7	1	Br---CH_3	294.1 ± 2.1	1
$\text{CH}_3\text{---CH}_2\text{CN}$	348.1 ± 12.6	1	$\text{Cl---C}\equiv\text{CCl}$	443 ± 50	1	$\text{Br---C}\equiv\text{CH}$	410.5	1
$\text{C}_6\text{H}_5\text{---CH}_2\text{CN}$	386.6 ± 8.4	1	$\text{Cl---C}\equiv\text{CH}$	435.6 ± 8.4	1	Br---CH=CH_2	338.3 ± 3.1	1
$\text{CH}_3\text{---CH(CH}_3\text{)CN}$	332.6 ± 8.4	1	$\text{Cl---CH}_2\text{CN}$	267.4	1	$\text{Br---CF}_2\text{CF}_3$	283.3 ± 6.3	1
$\text{CH}_3\text{---C(CH}_3)_2\text{CN}$	340.6 ± 16.7	1	Cl---CCl=CCl_2	383.7	1	Br---CClBrCF_3	251.0 ± 6.3	1
$\text{CH}_3\text{---C(CH}_3\text{)(CN)C}_6\text{H}_5$	250.6	1	Cl---CH=CH_2	394.1 ± 3.1	2	$\text{Br---CF}_2\text{CF}_2\text{Br}$	282.8 ± 6.7	1
$(\text{Ph})_2(\text{CN})\text{C---C(CN)(Ph)}_2$	109.6	1	Cl---CF=CF_2	434.7 ± 8.4	1	Br---CHClCF_3	274.9 ± 6.3	1
$(\text{NO}_2)_3\text{C---C(NO}_2)_3$	308.8	1	$\text{Cl---CF}_2\text{CF}_3$	346.0 ± 7.1	1	$\text{Br---CF}_2\text{CH}_3$	287.0 ± 5.4	1

Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.
Br-CH ₂ CH ₂ Cl	292.5 ± 8.4	1	I-2-naphthyl	272.0 ± 10.5	1	C ₆ H ₅ OO-H	384	1
Br-CHClCH ₃	272.0 ± 8.4	1	I-CH ₂ CN	187.0 ± 8.4	1	C ₆ H ₅ CH ₂ OO-H	363	1
Br-C ₂ H ₅	292.9 ± 4.2	1	I-CH ₂ OCH ₃	229.4 ± 8.4	1	(C ₆ H ₅) ₂ CHOO-H	370	1
Br-CH ₂ CH=CH ₂	237.2 ± 5.0	1	I-CH ₂ SCH ₃	216.8 ± 6.3	1	CH ₃ C(O)OO-H	386	1
Br-C ₃ H ₇	298.3 ± 4.2	1	I-C(O)CH ₃	223.0 ± 8.4	1	CCl ₂ (CN)OO-H	384	1
Br- <i>iso</i> -C ₃ H ₇	299.2 ± 6.3	1	I-C(O)C ₆ H ₅	212.1 ± 8.4	1	OHCH ₂ OO-H	368	1
Br-CH ₂ CH ₂ CH ₂ Br	324.7	1	I-CH ₂ C(O)OH	197.5 ± 2.7	1	H-ONO	330.7	1
Br-CF ₂ CF ₂ CF ₃	278.2 ± 10.5	1	I-C(NO ₂) ₃	144.8	1	H-OONO	299.2	1
CF ₃ CFBrCF ₃	274.2 ± 4.6	1				H-ONH ₂	318	1
Br-C ₄ H ₉	296.6 ± 4.2	1	(4) O-X BDEs			H-ONO ₂	426.8	1
Br- <i>sec</i> -C ₄ H ₉	300.0 ± 4.2	1	HO-H	497.10 ± 0.29	1	H-ONNOH	189	1
Br- <i>tert</i> -C ₄ H ₉	292.9 ± 6.3	1	FO-H	425.1	1	H-OPO ₂	465.7 ± 12.6	1
Br-C ₆ H ₅	336.4 ± 6.3	1	ClO-H	393.7	1	H-OSO ₂ OH	441.4 ± 14.6	1
Br-C ₆ F ₅	~328	1	BrO-H	405	1	H-OSiMe ₃	495	1
Br-CH ₂ C ₆ H ₅	239.3 ± 6.3	1	IO-H	403.3	1	(CH ₃)CHNO-H	354.4	1
Br-CH ₂ C ₆ F ₅	225.1 ± 6.3	1	CH ₃ O-H	440.2 ± 3	1	(CH ₃) ₂ CNO-H	354.0	1
Br-1-C ₁₀ H ₇	339.7	1	CF ₃ O-H	497.1	1	(C ₆ H ₅)CHNO-H	368.6	1
Br-2-C ₁₀ H ₇	341.8	1	HC≡CO-H	443.1	1	PhO-H	362.8 ± 2.9	1
Br-anthracenyl	322.6	1	C ₂ H ₅ O-H	441.0 ± 5.9	1	α-tocopherol RO-H	323.4	1
Br-C(O)CH ₃	292.0 ± 8.4	1	CH ₂ =CHO-H	355.6	1	β-tocopherol RO-H	335.6	1
Br-C(O)C ₆ H ₅	276.6 ± 8.4	1	CF ₃ CH ₂ O-H	447.7 ± 10.5	1	γ-tocopherol RO-H	335.1	1
Br-CH ₂ C(O)CH ₃	257.9 ± 10.5	1	C ₃ H ₇ O-H	≤433 ± 2	1	δ-tocopherol RO-H	342.8	1
Br-CH ₂ C(O)C ₆ H ₅	271	1	<i>iso</i> -C ₃ H ₇ O-H	442.3 ± 2.8	1	p-C ₆ H ₅ CH ₂ -C ₆ H ₄ O-H	356.2	1
Br-CH ₂ C(O)OH	257.4 ± 3.7	1	C ₄ H ₉ O-H	432.3	1	O-O ₂	106.6	1
Br-C(NO ₂) ₃	218.4	1	<i>sec</i> -C ₄ H ₉ O-H	441.4 ± 4.2	1	HO-OH	210.66 ± 0.42	1
I-CN	320.1	1	<i>tert</i> -C ₄ H ₉ O-H	444.9 ± 2.8	1	HO-OF	199.7 ± 8.4	1
I-CF ₃	227.2 ± 1.3	1	<i>tert</i> -BuCH ₂ O-H	436.1	1	HO-OC	~146	1
I-CCl ₃	168 ± 42	1	C ₆ H ₅ CH ₂ O-H	442.7 ± 8.8	1	HO-OB	138.5 ± 8.4	1
I-CH ₂ Cl	221.8 ± 4.2	1	CH ₃ C(OH)O-H	446.9 ± 6.3	1	FO-OF	199.6	1
I-CH ₂ Br	219.2 ± 5.4	1	(CH ₃) ₂ C(OH)O-H	450.6 ± 6.3	1	ClO-OC	72.4 ± 2.8	1
I-CH ₂ I	216.9 ± 7.9	1	HC(O)O-H	468.6 ± 12.6	1	IO-OI	74.9 ± 17	1
I-CH ₃	238.9 ± 2.1	1	CH ₃ C(O)O-H	468.6 ± 12.6	1	<i>trans-perp</i> -HO-ONO	≤67.8 ± 0.4	1
I-CH ₂ CN	187.0 ± 6.3	1	C ₂ H ₅ C(O)O-H	472.8	1	<i>cis-cis</i> -HO-ONO	83.3 ± 2.1	1
I-CF ₂ CF ₃	219.2 ± 2.1	1	<i>iso</i> -C ₃ H ₇ C(O)O-H	472.8	1	HO-ONO ₂	163.2 ± 8.4	1
I-CF ₂ CF ₂ I	217.6 ± 6.7	1	C ₆ H ₅ C(O)O-H	464.4 ± 16.7	1	HO-OCH ₃	189.1 ± 4.2	1
I-CH ₂ CF ₃	235.6 ± 4.2	1	HOO-H	366.06 ± 0.29	1	HO-OCF ₃	201.3 ± 20.9	1
I-CHFCClF ₂	202 ± 2	1	CH ₃ OO-H	370.3 ± 2.1	1	HO-OC ₂ H ₅	178.7 ± 6.3	1
I-CF ₂ CH ₃	217.6 ± 4.2	1	CF ₃ OO-H	383	1	HO-O- <i>iso</i> -C ₃ H ₇	185.8 ± 6.3	1
I-CFICH ₃	218.0 ± 4.2	1	CH ₂ FOO-H	379	1	HO-O- <i>tert</i> -C ₄ H ₉	186.2 ± 4.2	1
CF ₃ CFICF ₃	215.1	1	CCl ₃ OO-H	386	1	HO-OC(O)CH ₃	169.9 ± 2.1	1
I-CH=CH ₂	259.0 ± 4.2	1	CHCl ₂ OO-H	383	1	HO-OC(O)C ₂ H ₅	169.9 ± 2.1	1
I-C ₂ H ₅	233.5 ± 6.3	1	CH ₂ ClOO-H	379	1	CH ₃ O-OCH ₃	167.4 ± 6.3	1
I-CH ₂ CH=CH ₂	185.8 ± 6.3	1	CBr ₃ OO-H	383	1	CF ₃ O-OCF ₃	198.7 ± 2.1	1
I-C ₃ H ₇	236.8 ± 4.2	1	CH ₃ BrOO-H	379	1	C ₂ H ₅ O-OC ₂ H ₅	166.1	1
I- <i>iso</i> -C ₃ H ₇	234.7 ± 6.3	1	C ₂ H ₅ OO-H	354.8 ± 9.2	1	C ₃ H ₇ O-OC ₃ H ₇	155.2 ± 4.2	1
I-C ₄ F ₉	205.8	1	CH ₃ CHClOO-H	377	1	<i>iso</i> -C ₃ H ₇ O-O- <i>iso</i> -C ₃ H ₇	157.7	1
I- <i>tert</i> -C ₄ H ₉	227.2 ± 6.3	1	CH ₃ CCl ₂ OO-H	383	1	<i>sec</i> -C ₄ H ₉ O-O- <i>sec</i> -C ₄ H ₉	152.3 ± 4.2	1
I-C ₆ H ₅	272.0 ± 4.2	1	CF ₃ CHClOO-H	384	1	<i>tert</i> -BuO-O- <i>tert</i> -Bu	162.8 ± 2.1	1
I-C ₆ F ₅	<301.7	1	C ₂ Cl ₅ OO-H	383	1	<i>tert</i> -BuCH ₂ O-OCH ₂ - <i>tert</i> -Bu	152.3	1
I-CH ₂ C ₆ H ₅	187.8 ± 4.8	1	<i>iso</i> -C ₃ H ₇ OO-H	356	1	EtC(Me) ₂ O-OC(Me) ₂ Et	164.4 ± 4.2	1
I-1-naphthyl	274.5 ± 10.5	1	CH ₂ =CHCH ₂ OO-H	372.4	1	(CF ₃) ₃ CO-OC(CF ₃) ₃	148.5 ± 4.6	1
			<i>tert</i> -C ₄ H ₉ OO-H	352.3 ± 8.8	1			

Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.
$\text{Ph}_3\text{CO}-\text{OCPh}_3$	131.4	1	$\text{CH}_3\text{O}-\text{C}_4\text{H}_9$	346.0 ± 6.3	1	$\text{O}_2\text{N}-\text{ONO}_2$	95.4 ± 1.5	1
$\text{SF}_5\text{O}-\text{OSF}_5$	155.6	1	$\text{CH}_3\text{O}-\text{tert-C}_4\text{H}_9$	353.1 ± 6.3	1	<i>cis</i> -HO-NO	207.0	1
$\text{SF}_5\text{O}-\text{OOSF}_5$	126.8	1	$\text{C}_6\text{H}_5-\text{OCH}_3$	418.8 ± 5.9	1	<i>trans</i> -HO-NO	200.64 ± 0.19	1
$(\text{CH}_3)_3\text{CO}-\text{OSi}(\text{CH}_3)_3$	196.6	1	$\text{C}_6\text{H}_5\text{CH}(\text{CH}_3)-\text{OCH}_3$	313.4 ± 9.6	1	FO-NO	132.5 ± 17	1
<i>tert</i> -BuO-GeEt ₃	192.5	1	$\text{C}_6\text{H}_5-\text{OC}_6\text{H}_5$	326.8 ± 4.2	1	<i>cis</i> -ClO-NO	127.6 ± 8.4	1
<i>tert</i> -BuO-SnEt ₃	192.5	1	$\text{CH}_3-\text{OC}(\text{O})\text{H}$	383.7 ± 12.6	1	<i>trans</i> -ClO-NO	116.6 ± 8.4	1
$\text{CF}_3\text{OO}-\text{OCF}_3$	126.8 ± 8.4	1	HC(O)-OH	457.7 ± 2.1	1	<i>cis</i> -BrO-NO	138.1 ± 8.4	1
HC(O)O-OH	199.2 ± 8.4	1	$\text{CH}_3\text{C}(\text{O})-\text{OH}$	459.4 ± 4.2	1	<i>trans</i> -BrO-NO	121.6 ± 8.4	1
FC(O)O-OC(O)F	96.2	1	$\text{C}_6\text{H}_5\text{C}(\text{O})-\text{OH}$	447.7 ± 10.5	1	<i>trans-perp</i> -HOO-NO	114.2 ± 4	1
$\text{CH}_3\text{C}(\text{O})\text{O}-\text{ONO}_2$	131.4 ± 8.4	1	HO-CH ₂ C(O)OH	368.2 ± 10.5	1	CH ₃ O-NO	176.6 ± 3.3	1
$\text{CH}_3\text{C}(\text{O})\text{O}-\text{OC}(\text{O})\text{CH}_3$	140.2 ± 21	1	$\text{CH}_3-\text{OC}(\text{O})\text{CH}_3$	380.3 ± 12.6	1	C ₂ H ₅ O-NO	185.4 ± 4.2	1
$\text{CF}_3\text{C}(\text{O})\text{O}-\text{OC}(\text{O})\text{CF}_3$	125.5	1	HC(O)-OCH ₃	423.8 ± 4.2	1	C ₃ H ₇ O-NO	179.1 ± 6.3	1
$\text{CF}_3\text{OC}(\text{O})\text{O}-\text{OC}(\text{O})\text{F}$	121.3 ± 4.2	1	$\text{CH}_3\text{C}(\text{O})-\text{OCH}_3$	424.3 ± 6.3	1	<i>iso</i> -C ₃ H ₇ O-NO	175.3 ± 4.2	1
$\text{CF}_3\text{OC}(\text{O})\text{O}-\text{OCF}_3$	142.3 ± 2.9	1	$\text{C}_6\text{H}_5\text{C}(\text{O})-\text{OCH}_3$	421.3 ± 12.6	1	C ₄ H ₉ O-NO	177.8 ± 6.5	1
$\text{CF}_3\text{OC}(\text{O})\text{O}-\text{OC}(\text{O})\text{OCF}_3$	119.2	1	$\text{C}_6\text{H}_5\text{C}(\text{O})-\text{OC}_6\text{H}_5$	307.5 ± 8.4	1	<i>iso</i> -C ₄ H ₉ O-NO	175.7 ± 6.5	1
$\text{C}_2\text{H}_5\text{C}(\text{O})\text{O}-\text{OC}(\text{O})\text{C}_2\text{H}_5$	150.6	1	$\text{CH}_3\text{OCH}_2-\text{OCH}_3$	367.5 ± 8.4	1	<i>sec</i> -C ₄ H ₉ O-NO	173.6 ± 3.3	1
$\text{C}_3\text{H}_7\text{C}(\text{O})\text{O}-\text{OC}(\text{O})\text{C}_3\text{H}_7$	150.6	1	$\text{CH}_3\text{C}(\text{O})-\text{OC}(\text{O})\text{CH}_3$	382.4 ± 12.6	1	<i>tert</i> -C ₄ H ₉ O-NO	176.1 ± 5.9	1
FS(O) ₂ O-OS(O) ₂ F	92-100	1	$\text{C}_6\text{H}_5\text{C}(\text{O})-\text{OC}(\text{O})\text{C}_6\text{H}_5$	384.9 ± 16.7	1	<i>tert</i> -AmO-NO	171.1 ± 0.4	1
HO-CF ₃	$\leq 482.0 \pm 1.3$	1	CH_3-OOH	300.4 ± 12.6	1	C ₆ H ₅ O-NO	87.0	1
FO-CF ₃	408 ± 17	1	$\text{C}_2\text{H}_5-\text{OOH}$	332.2 ± 20.9	1	HO-NO ₂	205.4	1
HO-CH ₃	384.93 ± 0.71	1	$\text{C}_3\text{H}_7-\text{OOH}$	364.4	1	FO-NO ₂	131.8 ± 12.6	1
HO-C ₂ H ₅	391.2 ± 2.9	1	<i>iso</i> -C ₃ H ₇ -OOH	298.3	1	ClO-NO ₂	110.9	4
HO-CH ₂ CF ₃	408.4 ± 8.4	1	<i>tert</i> -C ₄ H ₉ -OOH	309.2 ± 4.2	1	BrO-NO ₂	118.0 ± 6.3	1
HO-CH ₂ CH=CH ₂	332.6 ± 4.2	1	$\text{CH}_3-\text{OOCH}_3$	292.5 ± 8.4	1	IO-NO ₂	~100	1
HO-C ₃ H ₇	392.0 ± 2.9	1	CF ₃ -OOCF ₃	361.5 ± 8.4	1	CH ₃ O-NO ₂	176.1 ± 4.2	1
HO- <i>iso</i> -C ₃ H ₇	397.9 ± 4.2	1	CH ₃ -OO	137.0 ± 3.8	1	C ₂ H ₅ O-NO ₂	174.5 ± 4.2	1
HO-C ₄ H ₉	389.9 ± 4.2	1	CF ₃ -OO	169.0	1	C ₃ H ₇ O-NO ₂	177.0 ± 4.2	1
HO- <i>sec</i> -C ₄ H ₉	396.1 ± 4.2	1	CClF ₂ -OO	127.6	1	<i>iso</i> -C ₃ H ₇ O-NO ₂	175.7 ± 4.2	1
HO- <i>iso</i> -C ₄ H ₉	394.1 ± 4.2	1	CCl ₂ F-OO	124.7	1	HOO-NO ₂	99.2 ± 4.6	1
HO- <i>tert</i> -C ₄ H ₉	398.3 ± 4.2	1	CH ₂ Cl-OO	122.4 ± 10.5	1	CH ₃ OO-NO ₂	86.6 ± 8.4	1
HO-CH(CH ₃)(nC ₃ H ₇)	398.3 ± 4.2	1	CHCl ₂ -OO	108.2 ± 8.2	1	CF ₃ OO-NO ₂	105	1
HO-CH(C ₂ H ₅) ₂	399.2 ± 4.2	1	CCl ₃ -OO	92.0 ± 6.4	1	CF ₂ ClOO-NO ₂	106.7	1
HO-C(CH ₃) ₂ (C ₂ H ₅)	395.8 ± 6.3	1	HC(O)-OOH	290.0	1	CFCl ₂ OO-NO ₂	106.7	1
HO-C ₆ H ₅	463.6 ± 4.2	1	$\text{CH}_3\text{C}(\text{O})-\text{OOC}(\text{O})\text{CH}_3$	315.1	1	CCl ₃ OO-NO ₂	95.8	1
HO-C ₆ F ₅	446.9 ± 9.2	1	ClO-CF ₃	$\leq 369.9 \pm 1.3$	1	CH ₃ N(O)-O	305.3 ± 4.4	1
HO-CH ₂ C ₆ H ₅	334.1 ± 2.6	1	CH ₃ -ONO	245.2	1	C ₆ H ₅ N(O)-O	392 ± 8	1
HO-C(CH ₃) ₂ C ₆ H ₅	339.3 ± 6.3	1	C ₂ H ₅ -ONO	260.2	1	C ₅ H ₅ N-O	264.9 ± 2.0	1
<i>cyclo</i> -C ₅ H ₉ -OH	385.8 ± 6.3	1	C ₃ H ₇ -ONO	249.4 ± 6.3	1	C ₆ H ₅ N=N(O)(C ₆ H ₅)-O	309.4 ± 3.5	1
1-C ₁₀ H ₇ -OH	468.6 ± 6.3	1	<i>iso</i> -C ₃ H ₇ -ONO	254.4 ± 6.3	1	C ₆ H ₅ (O)N=N(O)(C ₆ H ₅)-O	309.4 ± 3.6	1
2-C ₁₀ H ₇ -OH	467.8 ± 6.3	1	C ₄ H ₉ -ONO	256.5 ± 6.3	1	O-SO	551.1	1
(CH ₃) ₂ (NH ₂)C-OH	310.4 ± 6.3	1	<i>iso</i> -C ₄ H ₉ -ONO	254.0 ± 6.3	1	O-SOF ₂	513.3	1
CH ₃ C(O)-OH	459.4 ± 4.2	1	<i>sec</i> -C ₄ H ₉ -ONO	253.6 ± 6.3	1	O-SOCl ₂	398.5	1
HOCH ₂ -OH	411.3	1	<i>tert</i> -C ₄ H ₉ -ONO	252.7 ± 6.3	1	O-S(OH) ₂	493.7 ± 25	1
CH ₃ -OCH ₃	351.9 ± 4.2	1	(C ₂ H ₅)(CH ₃) ₂ C-ONO	254.0 ± 8.4	1	HO-SH	293.3 ± 16.7	1
ICH ₂ -OCH ₃	373.2 ± 12.6	1	CH ₃ -ONO ₂	340.2	1	HO-SOH	313.4 ± 12.6	1
CH ₃ O-C ₂ H ₅	355.2 ± 5.4	1	C ₂ H ₅ -ONO ₂	344.8	1	HO-S(OH)O ₂	384.9 ± 8.4	1
CH ₃ O-CHClCH ₃	370.3 ± 8.4	1	CH ₃ O-CH ₂ CN	393.3	1	HO-SCH ₃	303.8 ± 12.6	1
CH ₃ O-C ₃ H ₇	358.6 ± 6.3	1	O-N ₂	167.4 ± 0.4	1	HO-SO ₂ CH ₃	360.2 ± 12.6	1
CH ₃ O- <i>iso</i> -C ₃ H ₇	360.7 ± 4.2	1	O-NO	306.21 ± 0.13	1	F-OH	215.1	1
			O-NO ₂	206.3	1	F-OF	164.1	1
			NO-NO	40.6 ± 2.1	1			

Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.
F-OCF ₃	200.8 ± 4.2	1	ON-NO ₂	42.5	1	C ₆ H ₅ CH ₂ -NH ₂	306.7 ± 6.3	1
F-OCH ₃	>196.6	1	O ₂ N-NO ₂	57.3 ± 1	1	C ₆ H ₅ CH(CH ₃) ₃ -NH ₂	307.5 ± 9.6	1
F-ONO ₂	143.1	1	H ₂ N-NH ₂	277.0 ± 1.3	1	HC(O)-NH ₂	421.7 ± 8.4	1
Cl-OH	233.5	1	F ₂ N-NF ₂	92.9 ± 12.6	1	CH ₃ C(O)-NH ₂	414.6 ± 8.4	1
Cl-OCi	142	1	H ₂ N-NHCH ₃	275.8 ± 8.4	1	HS-NO	138.9	1
Cl-OCF ₃	≤220.9 ± 8.4	1	H ₂ N-N(CH ₃) ₂	259.8 ± 8.4	1	CH ₃ S-NO	104.6 ± 4.2	1
Cl-OCH ₃	200.8	1	H ₂ N-NHC ₆ H ₅	227.6 ± 8.4	1	<i>tert</i> -BuS-NO	115.1	1
Cl-O- <i>tert</i> -C ₄ H ₉	198.3	1	H ₂ N-NO ₂	230	1	PhCH ₂ S-NO	120.5	1
Cl-OOCl	91.2	1	H ₂ NN(CH ₃)-NO	179.6	1	C ₆ H ₅ S-NO	81.2 ± 5.4	1
Cl-ONO ₂	172.0	1	(C ₆ H ₅) ₂ N-NO	94.6	1	SCN-SCN	255.6	1
Br-OH	209.6 ± 4.2	1	N ₃ -CH ₃	335.1 ± 20.5	1	FSO ₂ -NF ₂	163	1
Br-OBBr	125	1	N ₃ -C ₆ H ₅	375.7 ± 20.9	1	F-NO	235.26	1
Br-O- <i>tert</i> -C ₄ H ₉	183.3	1	N ₃ -CH ₂ C ₆ H ₅	211.3 ± 14.2	1	F-NO ₂	221.3	1
Br-ONO ₂	143.1 ± 6.3	1	CH ₃ -NC	413.0 ± 3.3	1	F-NF ₂	254.0	1
I-OH	213.4	1	C ₂ H ₅ -NC	413.4 ± 8.4	1	F-NH ₂	286.6	1
I-OI	130.1	1	<i>iso</i> -C ₃ H ₇ -NC	423.0 ± 8.4	1	Cl-NO	158.8 ± 0.8	1
I-ONO ₂	>140.6	1	<i>tert</i> -C ₄ H ₉ -NC	399.6 ± 5.4	1	Cl-NO ₂	141.8 ± 1.3	1
(5) N-X BDEs			NC-NO	204.4	1	Cl-NF ₂	~134	1
H-NH ₂	450.08 ± 0.24	1	CH ₃ -NO	172	1	Cl-NH ₂	253.1	1
H-NF ₂	316.7 ± 10.5	1	CF ₃ -NO	167	1	Br-NO	120.1 ± 0.8	1
H-NNH	254.4	1	CCl ₃ -NO	125	1	Br-NO ₂	82.0 ± 7.1	1
H-N ₃	≤389	1	C ₂ H ₅ -NO	171.5	1	Br-NF ₂	<227.2	1
H-N=CH ₂	364 ± 25	1	CH ₂ CHCH ₂ -NO	110	1	I-NO	75.6 ± 4	1
H-NO	199.5	1	<i>iso</i> -C ₃ H ₇ -NO	152.7 ± 12.6	1	I-NO ₂	79.6 ± 4	1
H-NHOH	341	1	<i>tert</i> -C ₄ H ₉ -NO	167	1	(6) S-X BDEs		
H-NCO	460.7 ± 2.1	1	C ₆ H ₅ -NO	226.8 ± 2.1	1	H-SH	381.18 ± 0.05	1
H-NCS	≤396.6 ± 4.6	1	C ₆ F ₅ -NO	211.3 ± 4.2	1	H-SCH ₃	365.7 ± 2.1	1
H-NCS	347.3 ± 8.4	1	C ₆ H ₅ CH ₂ -NO	123	1	H-SCHCH ₂	351.5 ± 8.4	1
CH ₃ NH ₂	425.1 ± 8.4	1	CH ₃ -NO ₂	260.7 ± 2.1	1	H-SC ₂ H ₅	365.3	1
<i>tert</i> -BuNH ₂	397.5 ± 8.4	1	C ₂ H ₅ -NO ₂	254.4	1	H-SC ₃ H ₇	365.7	1
C ₆ H ₅ CH ₂ NH ₂	418.4	1	C ₃ H ₇ -NO ₂	256.5	1	H-S- <i>iso</i> -C ₃ H ₇	369.9 ± 8.4	1
(CH ₃) ₂ NH	395.8 ± 8.4	1	<i>iso</i> -C ₃ H ₇ -NO ₂	259.8	1	H-S- <i>tert</i> -C ₄ H ₉	362.3 ± 9.2	1
H-NHNH(CH ₃)	276 ± 21	1	C ₄ H ₉ -NO ₂	254.8	1	H-SOH	330.5 ± 14.6	1
H-NHN(CH ₃) ₂	356 ± 21	1	<i>sec</i> -C ₄ H ₉ -NO ₂	263.2	1	H-SCOCH ₃	370.7	1
NH ₂ CN	414.2	1	<i>tert</i> -C ₄ H ₉ -NO ₂	258.6	1	H-SCOPh	364	1
(NH ₂) ₂ C=O	464.4	1	C ₆ H ₅ -NO ₂	295.8 ± 4.2	1	H-SO ₂ CH ₃	≤397	1
(NH ₂) ₂ C=S	389.1	1	C ₆ H ₅ CH ₂ -NO ₂	210.3 ± 6.3	1	H-SSCH ₃	330.5 ± 14.6	1
CH ₃ CSNH ₂	380.7	1	(NO ₂)CH ₂ -NO ₂	207.1	1	H-SPh	349.4 ± 4.5	1
PhCSNH ₂	380.7	1	(NO ₂) ₃ C-NO ₂	176.1	1	H-SSH	318.0 ± 14.6	1
(PhNH) ₂ C=S	364.0	1	CF ₃ -NF ₂	280.7	1	H-SSSH	292.9 ± 6.5	1
(NH ₂) ₂ C=NH	435.1	1	C ₆ H ₅ CH ₂ -NF ₂	237.2 ± 14.6	1	HS-SH	270.7 ± 8.4	1
Ph ₂ C=NH	489.5	1	CH ₃ -NH ₂	356.1 ± 2.1	1	FS-SF	362.3	1
H-N(SiMe ₃) ₂	464	1	C ₂ H ₅ -NH ₂	352.3 ± 6.3	1	ClS-SCl	329.7	1
H-NHPh	375.3	1	C ₃ H ₇ -NH ₂	356.1 ± 2.9	1	HS-SCH ₃	272.0	1
C ₆ H ₅ NHOH	292	1	<i>iso</i> -C ₃ H ₇ -NH ₂	357.7 ± 3.8	1	HS-SPh	255.2 ± 6.3	1
C ₆ H ₅ NH(CONMe ₂)	387.9	1	C ₄ H ₉ -NH ₂	356.1 ± 2.9	1	CH ₃ S-SCH ₃	272.8 ± 3.8	1
H-NPh ₂	364.8	1	<i>sec</i> -C ₄ H ₉ -NH ₂	359.0 ± 2.9	1	C ₂ H ₅ S-SC ₂ H ₅	276.6	1
HN-N ₂	63	1	<i>iso</i> -C ₄ H ₉ -NH ₂	254.8 ± 5.0	1	MeS-SPh	272.0 ± 6.3	1
ON-N	480.7 ± 0.4	1	<i>tert</i> -C ₄ H ₉ -NH ₂	355.6 ± 6.3	1	C ₆ H ₅ S-SC ₆ H ₅	214.2 ± 12.6	1
ON-NO	8.49 ± 0.12	1	pyridin-2-yl-NH ₂	431	1	F ₅ S-SF ₅	305 ± 21	1
			C ₆ H ₅ -NH ₂	429.3 ± 4.2	1			

Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.
Ti($\eta^5\text{-C}_5\text{H}_5$) ₂ -CO	174	1	Cr(C ₆ H ₆)-C ₆ H ₆	268.2 ± 15.4	1	Fe-CH ₃	135 ± 29	1
Ti(CO)($\eta^5\text{-C}_5\text{H}_5$) ₂ -CO	170	1	Cr(CO) ₅ -C ₆ H ₆	57.3 ± 3.3	1	Fe(C ₂ H ₄)(CO) ₃ -C ₂ H ₄	89.1 ± 8	1
Ti-CH ₃	174 ± 29	1	(P(C ₆ H ₁₁) ₃) ₂ (CO) ₃ Cr-P(OMe) ₃	68.6 ± 2.5	1	Fe-C ₃ H ₅	218	1
Ti(Cl)($\eta^5\text{-C}_5\text{H}_5$) ₂ -CH ₃	276	1	($\eta^5\text{-C}_5\text{H}_5$)Mo(CO) ₃ -H	290	1	Fe-C ₃ H ₆	79	1
Ti(Cl)(($\eta^5\text{-C}_5\text{H}_5$) ₂ -C ₆ H ₅)	292	1	Mo($\eta^5\text{-C}_5\text{H}_5$) ₂ -H	246	1	Fe(CO) ₅ -Ni(CO) ₄	37.7	1
Ti(C ₆ H ₆)-C ₆ H ₅	308.7	1	Mo(H)($\eta^5\text{-C}_5\text{H}_5$) ₂ -H	256.9 ± 8.4	1	Fe(CO) ₅ -($\eta^3\text{-C}_3\text{H}_5$)	176	1
Zr($\eta^5\text{-C}_5\text{Me}_5$) ₂ -H	351.0 ± 7.5	1	Mo(CO) ₃ ($\eta^5\text{-C}_5\text{H}_5$)-I	216.7 ± 4.2	1	Fe(C ₃ H ₆)(CO) ₃ -C ₃ H ₆	~79.5	1
Zr(H)($\eta^5\text{-C}_5\text{Me}_5$) ₂ -H	326.4 ± 4	1	($\eta^5\text{-C}_5\text{Me}_5$) ₂ Mo-O	272	1	(CO) ₂ ($\eta^5\text{-C}_5\text{H}_5$)Ru-H	272	1
Zr($\eta^5\text{-C}_5\text{Me}_5$) ₂ -Cl	481.2	1	(P(C ₆ H ₁₁) ₃) ₂ (CO) ₃ Mo-H ₂	27.2 ± 0.8	1	(PMe ₃) ₂ ($\eta^5\text{-C}_5\text{Me}_5$)Ru-H	167.4	1
Zr($\eta^5\text{-C}_5\text{Me}_5$) ₂ -Br	410.0	1	(P(C ₆ H ₁₁) ₃) ₂ (CO) ₃ Mo-N ₂	37.7 ± 2.5	1	(CO) ₂ ($\eta^5\text{-C}_5\text{Me}_5$)Ru-Cl	337.6	1
Zr(I)($\eta^5\text{-C}_5\text{Me}_5$) ₂ -I	336.4 ± 2.1	1	Mo(CO) ₅ -CO	169.5 ± 8.4	1	($\eta^5\text{-C}_5\text{Me}_5$)(PMe ₃) ₂ Ru-Cl	<138	1
Zr($\eta^5\text{-C}_5\text{Me}_5$) ₂ (Ph)-OH	482.4 ± 6.3	1	Mo(CO) ₃ ($\eta^5\text{-C}_5\text{H}_5$)-CH ₃	203 ± 8	1	($\eta^5\text{-C}_5\text{Me}_5$)(PMe ₃) ₂ Ru-OH	204.6	1
Zr($\eta^5\text{-C}_5\text{Me}_5$) ₂ (Ph)(OH)-OH	482.8 ± 10.5	1	W(CO) ₅ -Xe	35.1 ± 0.8	1	(CO) ₄ Ru-CO	115 ± 1.7	1
Zr($\eta^5\text{-C}_5\text{Me}_5$) ₂ (NH ₂)H-NH ₂	421.3 ± 15.1	1	W(CO) ₃ ($\eta^5\text{-C}_5\text{H}_5$)-H	303	1	($\eta^5\text{-C}_5\text{Me}_5$)(PMe ₃) ₂ Ru-CH ₃	142.3	1
Zr($\eta^5\text{-C}_5\text{Me}_5$) ₃ -CH ₃	276 ± 10	1	W(H)($\eta^5\text{-C}_5\text{H}_5$) ₂ -H	310.9 ± 4.2	1	Os(H)(CO) ₄ -H	326.4	1
Zr($\eta^5\text{-C}_5\text{H}_5$) ₂ (C ₆ H ₅)-C ₆ H ₅	300 ± 10	1	W(I)($\eta^5\text{-C}_5\text{H}_5$) ₂ -H	273 ± 14	1	(CO) ₄ Os-CO	133 ± 2.6	1
Zr($\eta^5\text{-C}_5\text{H}_5$) ₂ (Si(SiMe ₃) ₃)-SiMe ₃	188 ± 30	1	(CO) ₅ W-H ₂	≥67	1	Os(C ₂ H ₂)(CO) ₄ -CO	99.5 ± 0.8	1
Hf(H)($\eta^5\text{-C}_5\text{Me}_5$) ₂ -H	346.0 ± 7.9	1	(P(C ₆ H ₁₁) ₃) ₂ (CO) ₃ W-($\eta^2\text{-H}_2$)	28.5 ± 2.1	1	(10.9) Group 9		
Hf($\eta^5\text{-C}_5\text{Me}_5$)(C ₄ H ₉)-C ₄ H ₉	274 ± 10	1	W(CO) ₅ -CO	192.5 ± 8.48.4	1	(CO) ₄ Co-Co(CO) ₄	83 ± 29	1
(10.5) Group 5			W(CH ₃)($\eta^5\text{-C}_5\text{H}_5$) ₂ -CH ₃	220.9 ± 4	1	(CO) ₄ Co-Mn(CO) ₅	96 ± 12	1
($\eta^5\text{-C}_5\text{H}_5$)(CO) ₃ V- $\eta^2\text{H}_2$	90 ± 20	1	(10.7) Group 7			(CO) ₄ Co-Re(CO) ₅	113 ± 15	1
($\eta^5\text{-C}_5\text{H}_5$)(CO) ₃ V-CO	146 ± 21	1	F ₃ Mn-MnF ₃	210.9 ± 2.5	1	Co(CO) ₄ -H	278	1
V-CH ₃	169 ± 18	1	(CO) ₅ Mn-Mn(CO) ₅	185 ± 8	1	Co(CO) ₃ (PPh ₃)-H	272	1
V-C ₆ H ₆	76.2	1	(CO) ₅ Mn-H	284.5	1	(CO) ₃ HCo-CO	~54	1
V(C ₆ H ₆)-C ₆ H ₆	307.8	1	(PPh ₃)Mn(CO) ₄ -H	286.2	1	($\eta^5\text{-C}_5\text{H}_5$)Co(CO)-CO	184.3 ± 4.8	1
Nb($\eta^5\text{-C}_5\text{H}_5$) ₂ H ₃ -TFE	18.8 ± 1.3	1	MnBr(CO) ₄ -CO	184	1	Co-CH ₂	331 ± 38	1
Ta(CH ₃) ₅ -CH ₃	261 ± 5	1	($\eta^5\text{-C}_5\text{H}_5$)(CO) ₂ Mn-CO	195.8 ± 9.2	1	Co-CH ₃	178 ± 8	1
(Me ₃ SiCH ₂) ₄ Ta-(CH ₂ SiMe ₃)	184.1 ± 8.4	1	Mn-CH ₃	>35 ± 12	1	cobalamin-CH ₃	150.6	1
(10.6) Group 6			Mn(CO) ₅ -CH ₃	187.0 ± 3.8	1	cobinamide-iC ₄ H ₉	104	1
[Cr(CO) ₃ ($\eta^5\text{-C}_5\text{Me}_5$) ₂]-Hg	61.5	1	Mn(CO) ₅ -C ₆ H ₅	207 ± 11	1	Co-C bonds in B ₁₂	123.8 ± 6.3	1
[Cr(CO) ₃ ($\eta^5\text{-C}_5\text{Me}_5$) ₂]-Hg	111.3	1	(CO) ₅ Mn-Re(CO) ₅	149 ± 11	1	Cl(CO) ₂ Rh-Rh(CO) ₂ Cl	94.6	1
Cr(CO) ₅ -Xe	37.7 ± 3.8	1	($\eta^5\text{-C}_5\text{H}_5$)Mn(CO) ₂ -PhMe	59.4 ± 3.3	1	HRh(m-xylyl)Rh-H	255.6 ± 1.7	1
(CO) ₂ (PPh ₃)($\eta^5\text{-C}_5\text{H}_5$)Cr-H	250.2 ± 4.2	1	(CO) ₅ Tc-Tc(CO) ₅	177.5 ± 1.9	1	(PiPr ₃) ₂ (Cl)Rh-H ₂	136.0	1
($\eta^5\text{-C}_5\text{H}_5$)Cr(CO) ₃ -H	257	1	(CO) ₅ Re-Re(CO) ₅	187 ± 4.8	1	(PiPr ₃) ₂ (Cl)Rh-N ₂	69.0	1
Cr(CO) ₅ -H ₂	78 ± 4	1	(CO) ₅ Re-H	313	1	(PiPr ₃) ₂ (Cl)Rh-CO	201.7	1
(P(C ₆ H ₁₁) ₃) ₂ (CO) ₃ Cr-H ₂	30.5 ± 0.4	1	(CO) ₅ Re-CH ₃	220 ± 8	1	HRh(m-xylyl)Rh-CH ₂ OH	195.4 ± 7.5	1
($\eta^5\text{-C}_6\text{H}_6$)(CO) ₃ Cr-H ₂	251 ± 17	1	(10.8) Group 8			Ir(Cl)(CO)(PMe ₃) ₂ -H	251	1
Cr(CO) ₅ -N ₂	81 ± 4	1	(CO) ₄ Fe-Fe(CO) ₅	171.5	1	Ir(H)($\eta^5\text{-C}_5\text{Me}_5$)(PMe ₃)-H	310.5 ± 21	1
(P(C ₆ H ₁₁) ₃) ₂ (CO) ₃ Cr-N ₂	38.9 ± 0.8	1	(CO) ₄ Fe(H) _x -H	259.4 ± 8.4	1	Ir(Cl)(H)(CO)(PEt ₃) ₂ -H	243.1	1
($\eta^5\text{-C}_5\text{Me}_5$)(CO) ₃ Cr-SH	193	1	($\eta^5\text{-C}_5\text{H}_5$)(CO) ₂ Fe-H	239	1	Ir(Cl)(H)(CO)(PPh ₃) ₂ -H	246.9	1
Cr(CO) ₅ -CO	154.0 ± 8.4	1	Fe(CO) ₃ (N ₂)-N ₂	37.7 ± 19.2	1	(Cl)(CO)(PPh ₃) ₂ Ir-H ₂	62.8	1
Cr(CO) ₅ -CH ₄	~33.5 ± 8	1	Fe(C ₂ H ₂)(CO) ₄ -CO	88 ± 2.3	1	(Cl)(CO)(PPh ₃) ₂ Ir-CO	45.2	1
Cr-C ₆ H ₆	9.6 ± 5.8	1	Fe(CO) ₂ (PMe ₃)-CO	>125	1	Ir(H)($\eta^5\text{-C}_5\text{Me}_5$)(PMe ₃)-C ₆ H ₅	321	1
			Fe(CO) ₃ (PPh ₃)-CO	<177.8 ± 5	1	(10.10) Group 10		
			Fe-NH ₃	31.4 ± 4.2	1	Ni-H ₂ O	~29	1
			Fe-CH ₂	364 ± 29	1	Ni(CO) ₃ -N ₂	~42	1

Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	Bond	$D_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.
Ni(CO) ₃ -CO	104.6 ± 8.4	1	Cu(C ₆ H ₆)-C ₆ H ₆	27.0 ± 19.3	1	(10.13) Group 13		
Ni-CH ₃	208 ± 8	1	Ag-CH ₃	134.1 ± 6.8	1	H ₃ B-BH ₃	172	1
Ni-C ₂ H ₂	193 ± 25	1	Ag-NH ₃	8 ± 13	1	H ₃ B-NH ₃	130.1 ± 4.2	1
Ni-C ₂ H ₄	147.3 ± 17.6	1	Ag(NH ₃)-NH ₃	62.8 ± 4.2	1	(CH ₃) ₃ B-NH ₃	57.7 ± 1.3	1
Ni-propyne	155 ± 21	1	Au-OH	>262	1	F ₃ B-N(CH ₃) ₃	130 ± 4.6	1
Ni-2-butyne	121 ± 21	1	Au-NH ₃	76 ± 6	1	Cl ₃ B-N(CH ₃) ₃	127.6	1
Pd-OH	213	1	Au-CH ₃	≥191.6	1	F ₂ B-CH ₃	397 - 418	1
trans-Pt(PPh ₃) ₂ (Cl)-H	307 ± 37	1	Au-C ₆ H ₆	8.4	1	Al-OH	547 ± 13	1
[Ph ₂ PCH ₂] ₂ MePt-H	104.6	1	(10.12) Group 12			Al-C ₂ H ₂	>54	1
[Ph ₂ PCH ₂] ₂ MePt-OH	167.4	1	Zn-CH ₃	70 ± 10	1	Cl ₃ Al-N(CH ₃) ₃	198.7 ± 8.4	1
[Ph ₂ PCH ₂] ₂ MePt-SH	90.0	1	Zn(CH ₃)-CH ₃	266.5 ± 6.3	1	(CH ₃) ₃ Al-N(CH ₃) ₃	130	1
Pt(η ⁵ -C ₅ H ₅)(CH ₃) ₂ -CH ₃	163 ± 21	1	Zn-C ₂ H ₅	92.0 ± 17.6	1	(CH ₃) ₃ Al-O(CH ₃) ₂	92	1
cis-Pt(PET ₃) ₂ (CH ₃)-CH ₃	269 ± 13	1	Zn(C ₂ H ₅)-C ₂ H ₅	219.2 ± 8.4	1	(CH ₃) ₃ Ga-O(C ₂ H ₅) ₂	50.6 ± 0.8	1
(10.11) Group 11			Cd-CH ₃	63.6 ± 10.0	1	Cl ₃ Ga-S(C ₂ H ₅) ₂	235.1	1
Cu-OH	>406	1	Cd(CH ₃)-CH ₃	234.3 ± 6.3	1	In-CH ₃	216.3	1
Cu-CO	25 ± 5	1	Hg-CH ₃	22.6 ± 12.6	1	In(CH ₃) ₁ -CH ₃	318.8	1
Cu-CH ₃	223 ± 5	1	Hg(CH ₃)-CH ₃	239.3 ± 6.3	1	In(CH ₃) ₂ -CH ₃	587.4	1
Cu-NH ₃	47 ± 15	1	ClHg-CH ₃	280.0 ± 12.6	1	(CH ₃) ₃ In-N(CH ₃) ₃	83.3 ± 2.1	1
Cu(NH ₃)-NH ₃	83.7 ± 4.2	1	BrHg-CH ₃	270 ± 38	1	Tl-OH	330 ± 30	1
Cu-C ₆ H ₆	16.4 ± 12.5	1	IHg-CH ₃	258.6 ± 12.6	1			

References

1. Luo, Y. R. *Comprehensive Handbook of Chemical Bond Energies*, CRC Press, Boca Raton, FL, 2007.
2. Shuman, N. S., Ochieng, M. A., Sztáray, B., and Baer, T., *J. Phys. Chem. A* 112, 5647, 2008.
3. Seetula, J. A., and Eskola, A. J., *Chem. Phys.* 351, 141, 2008.
4. Golden, D. M., *Int. J. Chem. Kinet.* 41, 573, 2009.
5. Shuman, N. S., Spencer, A. P., and Baer, T., *J. Phys. Chem. A* 113, 9458, 2009.

TABLE 4. Enthalpies of Formation of Free Radicals and Other Transient Species

References: Yu-Ran Luo, *Comprehensive Handbook of Chemical Bond Energies*, CRC Press, 2007.

Radical	$\Delta_f H_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.	Radical	$\Delta_f H_{298}^{\circ}/\text{kJ mol}^{-1}$	Ref.
(1) Carbon-Centered Species			n-C ₃ H ₇ •, n-propyl, CH ₃ CH ₂ C•H ₂	100 ± 2	1
CH	595.8 ± 0.6	1	i-C ₃ H ₇ •, i-propyl, CH ₃ C•HCH ₃	88 ± 3	1
CH ₂ (triplet)	391.2 ± 1.6	1	•n-C ₄ H ₉ , CH≡CCH=C•H	547.3	1
CH ₂ (singlet)	428.8 ± 1.6	1	•i-C ₄ H ₉ , CH ₂ =C•C≡CH	499.2	1
•CH ₃ , methyl	146.7 ± 0.3	1	•C ₄ H ₉ , CH ₃ C≡CC•H ₂	304.5	1
•C ₂ H, acetynyl, CH≡C•	567.4 ± 2.1	1	•C ₄ H ₉ , CH≡CC•HCH ₃	316.5	1
•C ₂ H ₂ , vinylidene, CH ₂ =C••	419.7 ± 16.7	1	•C ₄ H ₉ , •CH=CHCHCH ₂	364.4	1
•C ₂ H ₃ , vinyl, CH ₂ =C•H	299.6 ± 3.3	1	•C ₄ H ₉ , CH ₂ =CHC•CH ₂	313.3	1
•C ₂ H ₅ , ethyl, CH ₃ C•H ₂	118.8 ± 1.3	1	•C ₄ H ₇ , CH ₃ CH=CHC•H ₂	146 ± 8	1
•C ₃ H ₃ , propargyl, CH≡CC•H ₂	351.9	2	•C ₄ H ₇ , CH ₂ =CHCH ₂ C•H ₂	192.5	1
•C ₃ H ₃ , CH ₃ C≡C•	515 ± 13	1	•C ₄ H ₇ , CH ₂ =C(CH ₃)C•H ₂	137.9	1
•C ₃ H ₃ , CH ₂ =C=CH• ↔ CH≡CC•H ₂	351.9	2	•C ₄ H ₇ , CH ₂ =CHC•HCH ₃	136.2	1
•C ₃ H ₃ , cyclopro-2-en-1-yl	439.7 ± 17.2	1	•C ₄ H ₇ , cyclopropylmethyl	213.8 ± 6.7	1
•C ₃ H ₃ , allyl, CH ₂ =CHC•H ₂	171.0 ± 3.0	1	•C ₄ H ₇ , cyclobutyl	219.2 ± 4.2	1
•C ₃ H ₃ , CH ₃ CH=C•H	267 ± 6	1	n-C ₄ H ₉ •, n-butyl, CH ₃ CH ₂ CH ₂ C•H ₂	77.8 ± 2.1	1
•C ₃ H ₃ , CH ₃ C•=CH ₂	231.4	1	i-C ₄ H ₉ •, i-butyl, (CH ₃) ₂ CHC•H ₂	70 ± 4	1
•C ₃ H ₃ , cyclopropyl	279.9 ± 10.5	1	s-C ₄ H ₉ •, s-butyl, CH ₃ C•HCH ₂ CH ₃	67.8 ± 2.1	1
			t-C ₄ H ₉ •, t-butyl, (CH ₃) ₃ C•	48 ± 3	1

Radical	$\Delta_f H^\circ_{298}/\text{kJ mol}^{-1}$	Ref.
$\cdot\text{C}_5\text{H}_3, \text{CH}\equiv\text{C}-\text{C}\equiv\text{CC}\cdot\text{H}_2$	579.1	1
$\cdot\text{C}_5\text{H}_3, (\text{CH}\equiv\text{C})_2\text{C}\cdot\text{H}$	573.2	1
$\cdot\text{C}_5\text{H}_5, \text{CH}_2=\text{CHC}\equiv\text{CC}\cdot\text{H}_2$	351.5	1
$\cdot\text{C}_5\text{H}_5, \text{CH}_2=\text{CH}-\text{C}\cdot\text{H}-\text{C}\equiv\text{CH}$	372.4	1
$\cdot\text{C}_5\text{H}_5, \text{cyclopenta-1,3-dien-5-yl}$	274.1 ± 7.3	1
$\cdot\text{C}_5\text{H}_7, \text{CH}_3\text{C}\equiv\text{CC}\cdot\text{HCH}_3$	272.8 ± 9.2	1
$\cdot\text{C}_5\text{H}_7, \text{CH}\equiv\text{CC}\cdot\text{HC}_2\text{H}_5$	277.0 ± 8.4	1
$\cdot\text{C}_5\text{H}_7, \text{CH}\equiv\text{CC}\cdot(\text{CH}_3)_2$	257.3 ± 9.2	1
$\cdot\text{C}_5\text{H}_7, \text{CH}_2=\text{CHCH}=\text{CHC}\cdot\text{H}_2$	205.0 ± 12.6	1
$\cdot\text{C}_5\text{H}_7, (\text{CH}_2=\text{CH})_2\text{C}\cdot\text{H}$	208.0 ± 4.2	1
$\cdot\text{C}_5\text{H}_7, \text{CH}_3\text{CH}=\text{C}=\text{CHC}\cdot\text{H}_2$	278.0	1
$\cdot\text{C}_5\text{H}_7, \text{spiropentyl}$	380.7 ± 4.2	1
$\cdot\text{C}_5\text{H}_7, \text{cyclopent-1-en-3-yl}$	160.7 ± 4.2	1
$\cdot\text{C}_5\text{H}_9, \text{cyclopentyl}$	105.9 ± 4.2	1
$\cdot\text{C}_5\text{H}_9, \text{CH}_2=\text{CHC}\cdot\text{HCH}_2\text{CH}_3$	109.6 ± 8.4	1
$\cdot\text{C}_5\text{H}_9, \text{CH}_3\text{CH}=\text{CHC}\cdot\text{H}(\text{CH}_3)$	92	1
$\cdot\text{C}_5\text{H}_9, \text{CH}_3\text{CH}=\text{C}(\text{CH}_3)\text{C}\cdot\text{H}_2$	92.0	1
$\cdot\text{C}_5\text{H}_9, \text{CH}_2=\text{CHC}\cdot(\text{CH}_3)_2$	87.0 ± 8.4	1
$\cdot\text{C}_5\text{H}_9, \text{CH}_2=\text{C}(\text{CH}_3)\text{C}\cdot\text{H}(\text{CH}_3)$	93.7	1
$\cdot\text{C}_5\text{H}_9, \text{CH}_2=\text{C}(\text{C}\cdot\text{H}_2)\text{CH}_2\text{CH}_3$	114.2	1
$\cdot\text{C}_5\text{H}_9, \text{CH}_2=\text{CH}(\text{CH}_2)_2\text{C}\cdot\text{H}_2$	179.5	1
$\text{nC}_5\text{H}_{11}\cdot, \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{C}\cdot\text{H}_2$	54.4	1
$\cdot\text{C}_5\text{H}_{11}, (\text{C}_2\text{H}_5)_2\text{C}\cdot\text{H}$	47.0	1
$\cdot\text{C}_5\text{H}_{11}, (\text{nC}_3\text{H}_7)(\text{CH}_3)\text{C}\cdot\text{H}$	50.2	1
$\cdot\text{C}_5\text{H}_{11}, (\text{CH}_3)_3\text{C}\cdot\text{CH}_2$	36.4 ± 8.4	1
$\cdot\text{C}_5\text{H}_{11}, (\text{C}_2\text{H}_5)(\text{CH}_3)_2\text{C}\cdot$	29	1
$\cdot\text{C}_6\text{H}_5, \text{phenyl}$	330.1 ± 3.3	1
$\cdot\text{C}_6\text{H}_7, \text{cyclohexa-1,3-dien-5-yl}$	199.2	1
$\cdot\text{C}_6\text{H}_7, \text{cyclohexa-1,4-dien-3-yl}$	208.0 ± 3.9	5
$\cdot\text{C}_6\text{H}_9, \text{CH}_3\text{C}\equiv\text{CC}\cdot(\text{CH}_3)_2$	221.8 ± 9.2	1
$\cdot\text{C}_6\text{H}_9, (\text{CH}_2=\text{CH})_2\text{C}\cdot(\text{CH}_3)$	193.7	1
$\cdot\text{C}_6\text{H}_9, \text{cyclohexa-1-en-3-yl}$	119.7	1
$\cdot\text{C}_6\text{H}_{11}, \text{CH}_2=\text{CH}(\text{CH}_2)_3\text{C}\cdot\text{H}_2$	158.6	1
$\cdot\text{C}_6\text{H}_{11}, \text{CH}_2=\text{CHC}\cdot\text{H}(\text{CH}_2)_2\text{CH}_3$	89.0	1
$\cdot\text{C}_6\text{H}_{11}, \text{CH}_2=\text{C}(\text{CH}_3)\text{C}\cdot(\text{CH}_3)_2$	37.7 ± 6.3	1
$\cdot\text{C}_6\text{H}_{11}, (\text{CH}_3)_2\text{C}=\text{C}(\text{CH}_3)\text{C}\cdot\text{H}_2$	39.7 ± 6.3	1
$\cdot\text{C}_6\text{H}_{11}, (\text{CH}_3)_2\text{C}=\text{CHC}\cdot\text{H}(\text{CH}_3)$	47.3	1
$\cdot\text{C}_6\text{H}_{11}, (\text{Z})-\text{CH}_3\text{CH}=\text{CHC}\cdot(\text{CH}_3)_2$	54.4	1
$\cdot\text{C}_6\text{H}_{11}, \text{cyclohexyl}$	75.3 ± 6.3	1
$\text{nC}_6\text{H}_{13}\cdot, \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{C}\cdot\text{H}_2$	33.5	1
$\cdot\text{C}_6\text{H}_{13}, (\text{nC}_4\text{H}_9)(\text{CH}_3)\text{C}\cdot\text{H}$	29.3	1
$\cdot\text{C}_6\text{H}_{13}, 2\text{-methyl-2-pentyl}$	3.3 ± 8.4	1
$\cdot\text{C}_6\text{H}_{13}, 3\text{-methyl-3-pentyl}$	14.2	1
$\cdot\text{C}_6\text{H}_{13}, 2,3\text{-dimethyl-2-butyl}$	3.1 ± 10	1
$\cdot\text{C}_7\text{H}_3, (\text{CH}\equiv\text{C})_3\text{C}\cdot$	784.5	1
$\cdot\text{C}_7\text{H}_7, \text{benzyl}, \text{C}_6\text{H}_5\text{C}\cdot\text{H}_2$	208.0 ± 1.7	1
$\cdot\text{C}_7\text{H}_7, \text{quadricyclolan-5-yl}$	578.6 ± 5.4	1
$\cdot\text{C}_7\text{H}_7, \text{quadricyclolan-4-yl}$	587.4 ± 5.4	1
$\cdot\text{C}_7\text{H}_7, \text{norborna-2,5-dien-7-yl}$	511.7 ± 7.9	1
$\cdot\text{C}_7\text{H}_7, \text{cyclohepta-1,3,5-trien-7-yl}$	285.3 ± 12.6	1
$\cdot\text{C}_7\text{H}_9, \text{CH}_2=\text{CH}(\text{CH}=\text{CH})_2\text{CC}\cdot\text{H}_2$	251.0	1

Radical	$\Delta_f H^\circ_{298}/\text{kJ mol}^{-1}$	Ref.
$\cdot\text{C}_7\text{H}_9, (\text{CH}_2=\text{CH})_3\text{C}\cdot$	274.0	1
$\cdot\text{C}_7\text{H}_{11}, \text{norborn-1-yl}$	136.4 ± 10.5	1
$\cdot\text{C}_7\text{H}_{11}, \text{cycloheptenyl}$	119.2	1
$\cdot\text{C}_7\text{H}_{13}, \text{cycloheptyl}$	50.6 ± 4.2	1
$\cdot\text{C}_7\text{H}_{13}, \text{cyclo-}[\text{C}\cdot(\text{CH}_3)(\text{CH}_2)_5]$	22.6	1
$\cdot\text{C}_7\text{H}_{13}, \text{cyclo-}[\text{C}\cdot(\text{CH}_2\text{CH}_3)(\text{CH}_2)_4]$	47.0	1
$\cdot\text{C}_7\text{H}_{15}, (\text{nC}_5\text{H}_{11})(\text{CH}_3)\text{CH}\cdot$	8.4	1
$\cdot\text{C}_7\text{H}_{15}, (\text{CH}_3)_2\text{CHCHC}\cdot(\text{CH}_3)_2$	-21.8 ± 5.2	1
$\cdot\text{C}_8\text{H}_7, \text{cubyl}$	831.0 ± 16.7	1
$\cdot\text{C}_8\text{H}_7, \text{C}_6\text{H}_5\text{C}\cdot=\text{CH}_2$	309.6	1
$\cdot\text{C}_8\text{H}_7, \text{C}_6\text{H}_5\text{CH}=\text{CH}\cdot$	387.0	1
$\cdot\text{C}_8\text{H}_9, \text{C}_6\text{H}_5\text{C}\cdot\text{H}(\text{CH}_3)$	175.7 ± 7.5	1
$\cdot\text{C}_8\text{H}_9, \text{C}_6\text{H}_5\text{CH}_2\text{C}\cdot\text{H}_2$	236.0 ± 7.5	1
$\cdot\text{C}_8\text{H}_9, \text{p-CH}_3\text{C}_6\text{H}_4\text{C}\cdot\text{H}_2$	167.4	1
$\cdot\text{C}_8\text{H}_9, \text{m-CH}_3\text{C}_6\text{H}_4\text{C}\cdot\text{H}_2$	167.4	1
$\cdot\text{C}_8\text{H}_9, \text{o-CH}_3\text{C}_6\text{H}_4\text{C}\cdot\text{H}_2$	167.4	1
$\cdot\text{C}_8\text{H}_9, 1\text{-vinyl-cyclohexa-2,4-dienyl}$	247.7 ± 14.2	1
$\cdot\text{C}_8\text{H}_9, 2\text{-vinyl-cyclohexa-2,4-dienyl}$	249.8 ± 14.2	1
$\cdot\text{C}_8\text{H}_9, 3\text{-vinyl-cyclohexa-2,4-dienyl}$	269.4 ± 14.2	1
$\cdot\text{C}_8\text{H}_9, 6\text{-vinyl-cyclohexa-2,4-dienyl}$	284.5 ± 14.2	1
$\cdot\text{C}_8\text{H}_{13}, \text{CH}_2=\text{CHCH}=\text{CHC}\cdot\text{H}(\text{CH}_2)_2\text{CH}_3$	130.5	1
$\cdot\text{C}_8\text{H}_{13}, \text{CH}_2=\text{CHC}\cdot\text{H}(\text{CH}_2)_3\text{CH}=\text{CH}_2$	130.5	1
$\cdot\text{C}_8\text{H}_{13}, \text{bicyclooct-1-yl}$	92.0	1
$\cdot\text{C}_8\text{H}_{15}, \text{CH}_2=\text{CHC}\cdot\text{H}(\text{CH}_2)_4\text{CH}_3$	49.8	1
$\cdot\text{C}_8\text{H}_{15}, (\text{E})-\text{CH}_3\text{CH}=\text{C}\cdot(\text{CH}_2)_4\text{CH}_3$	29.7	1
$\cdot\text{C}_8\text{H}_{15}, (\text{Z})-(\text{CH}_3)_2\text{C}\cdot\text{CH}=\text{CHCH}(\text{CH}_3)_2$	9.2	1
$\cdot\text{C}_8\text{H}_{15}, \text{cyclooctanyl}$	59.4	1
$\cdot\text{C}_8\text{H}_{15}, \text{cyclo-}[\text{C}\cdot(\text{CH}_2\text{CH}_3)(\text{CH}_2)_5]$	10.0	1
$\cdot\text{C}_9\text{H}_7, \text{indenyl}$	297.1	1
$\cdot\text{C}_9\text{H}_9, \text{indanyl-1}$	204.2 ± 8.4	1
$\cdot\text{C}_9\text{H}_{11}, 2,6\text{-dimethylbenzyl}$	124.7	1
$\cdot\text{C}_9\text{H}_{11}, 3,6\text{-dimethylbenzyl}$	124.7	1
$\cdot\text{C}_9\text{H}_{11}, 3,5\text{-dimethylbenzyl}$	124.7	1
$\cdot\text{C}_9\text{H}_{11}, \text{C}_6\text{H}_5\text{C}\cdot(\text{CH}_3)_2$	133.9 ± 4.2	1
$\cdot\text{C}_9\text{H}_{11}, \text{o-C}_6\text{H}_4\text{C}_2\text{H}_5$	279.5 ± 7.5	1
$\cdot\text{C}_9\text{H}_{17}, \text{cyclononanyl}$	52.3	1
$\cdot\text{C}_{10}\text{H}_7, \text{naphth-1-yl}$	401.7 ± 5.4	1
$\cdot\text{C}_{10}\text{H}_7, \text{naphth-2-yl}$	400.4 ± 5.9	1
$\cdot\text{C}_{10}\text{H}_{11}, \text{tetralin-1-yl}$	154.8 ± 5.0	1
$\cdot\text{C}_{10}\text{H}_{13}, 1\text{-phenyl-but-4-yl}$	192.0	1
$\cdot\text{C}_{10}\text{H}_{13}, (\text{C}_6\text{H}_5\text{CH}_2)(\text{C}_2\text{H}_5)\text{C}\cdot\text{H}$	184.5	1
$\cdot\text{C}_{10}\text{H}_{13}, (\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2)(\text{CH}_3)\text{C}\cdot\text{H}$	184.5	1
$\cdot\text{C}_{10}\text{H}_{13}, (\text{C}_6\text{H}_5\text{C}\cdot\text{HCH}_2\text{CH}_2\text{CH}_3)$	134.7	1
$\cdot\text{C}_{10}\text{H}_{15}, 1\text{-adamantyl}$	51.5	1
$\cdot\text{C}_{10}\text{H}_{15}, 2\text{-adamantyl}$	61.9	1
$\cdot\text{C}_{10}\text{H}_{19}, \text{cyclodecanyl}$	32.2	1
$\cdot\text{C}_{11}\text{H}_9, 1\text{-naphthylmethyl}$	252.7	1
$\cdot\text{C}_{11}\text{H}_{21}, \text{cycloundecanyl}$	7.5	1
$\cdot\text{C}_{12}\text{H}_{23}, \text{cyclododecanyl}$	-38.5	1
$\cdot\text{C}_{13}\text{H}_9, 9\text{-fluorenyl}$	297.5	1
$\cdot\text{C}_{13}\text{H}_{11}, (\text{C}_6\text{H}_5)_2\text{C}\cdot\text{H}$	302.1 ± 4.2	1

Radical	$\Delta_f H^\circ_{298}/\text{kJ mol}^{-1}$	Ref.
$\cdot\text{C}_{13}\text{H}_{11}$, 9-methyl-9-fluorenyl	268.2	1
$\cdot\text{C}_{14}\text{H}_{11}$, 9,10-dihydroanthracen-9-yl	261.0	1
$\cdot\text{C}_{15}\text{H}_{11}$, 9-anthracenylmethyl	337.6	1
$\cdot\text{C}_{15}\text{H}_{11}$, 9-phenanthrenylmethyl	311.3	1
$\cdot\text{C}_{16}\text{H}_{31}$, $\text{CH}_2=\text{CHC}\cdot\text{H}(\text{CH}_2)_{12}\text{CH}_3$	-118.8	1
$\cdot\text{C}_{19}\text{H}_{15}$, trityl, $(\text{C}_6\text{H}_5)_3\text{C}\cdot$	392.0 $\pm$ 8.4	1
$\cdot\text{C}_{35}\text{H}_{25}$, pentamethylcyclopentadienyl	67.4	1
CF	255.2 $\pm$ 8	1
CF ₂	-182.0 $\pm$ 6.3	1
FC $\cdot$ (O)	-161.2 $\pm$ 8.4	1
CHF	143.0 $\pm$ 12.6	1
CClF	31.0 $\pm$ 13.4	1
CCl	443.1 $\pm$ 13.0	1
CCl ₂	226	1
ClC $\cdot$ (O)	-21.8 $\pm$ 2.5	1
CHCl	326.4 $\pm$ 8.4	1
CClBr	267	1
CBr	510 $\pm$ 63	1
CHBr	373 $\pm$ 18	1
CBr ₂	343.5	1
Cl	570 $\pm$ 35	1
Cl ₂	468 $\pm$ 60	1
$\cdot\text{CF}_3$	-465.7 $\pm$ 2.1	1
$\cdot\text{CHF}_2$	-238.9 $\pm$ 4.2	1
$\cdot\text{CH}_2\text{F}$	-31.8 $\pm$ 4.2	1
$\cdot\text{CClF}_2$	-279.0 $\pm$ 8.4	1
$\cdot\text{CCl}_2\text{F}$	-89.0 $\pm$ 8.4	1
$\cdot\text{CBrClF}$	-35.5 $\pm$ 6.3	1
$\cdot\text{CHClF}$	-60.7 $\pm$ 10.0	1
$\cdot\text{CBrF}_2$	-224.7 $\pm$ 12.6	1
$\cdot\text{CCl}_3$	71.1 $\pm$ 2.5	1
$\cdot\text{CHCl}_2$	87.1 $\pm$ 1.6	1
$\cdot\text{CH}_2\text{Cl}$	117.2 $\pm$ 2.9	1
$\cdot\text{CHBrCl}$	140 $\pm$ 4	1
$\cdot\text{CHBr}_2$	199.1 $\pm$ 2.7	3
$\cdot\text{CBr}_2\text{Cl}$	163 $\pm$ 8	1
$\cdot\text{CBrCl}_2$	124 $\pm$ 8	1
$\cdot\text{CBr}_3$	214.8	1
$\cdot\text{CH}_2\text{Br}$	171.1 $\pm$ 2.7	1
$\cdot\text{Cl}_3$	424.9 $\pm$ 2.8	1
$\cdot\text{CHI}_2$	314.4 $\pm$ 3.3	1
$\cdot\text{CH}_2\text{I}$	229.7 $\pm$ 8.4	1
$\cdot\text{C}_2\text{F}$, $\text{FC}\equiv\text{C}\cdot$	460.0 $\pm$ 21.0	1
$\cdot\text{C}_2\text{Cl}$, $\text{ClC}\equiv\text{C}\cdot$	568 $\pm$ 26	1
$\cdot\text{C}_2\text{F}_3$, $\text{CF}_2=\text{C}\cdot\text{F}$	-192.0 $\pm$ 8.4	1
$\cdot\text{C}_2\text{F}_2\text{H}$, $\text{CF}_2=\text{C}\cdot\text{H}$	-92.9 $\pm$ 8.4	1
$\cdot\text{C}_2\text{F}_2\text{H}$, $\text{CHF}=\text{C}\cdot\text{F}$	-50.6 $\pm$ 8.4	1
$\cdot\text{CCl}_2\text{H}$, $\text{CHCl}=\text{C}\cdot\text{Cl}$	234.7 $\pm$ 8.4	1
$\cdot\text{CClH}_2$, $\text{CH}_2=\text{C}\cdot\text{Cl}$	>251	1
$\cdot\text{C}_2\text{F}_5$, $\text{CF}_3\text{C}\cdot\text{F}_2$	-892.9 $\pm$ 4.2	1
$\cdot\text{C}_2\text{HF}_4$, $\text{CF}_3\text{C}\cdot\text{HF}$	-680.8 $\pm$ 9.6	1

Radical	$\Delta_f H^\circ_{298}/\text{kJ mol}^{-1}$	Ref.
$\cdot\text{C}_2\text{HF}_4$, $\text{CHF}_2\text{C}\cdot\text{F}_2$	-664.8	1
$\cdot\text{C}_2\text{H}_2\text{F}_3$, $\text{CF}_3\text{C}\cdot\text{H}_2$	-517.1 $\pm$ 8.4	1
$\cdot\text{C}_2\text{H}_2\text{F}_3$, $\text{CHF}_2\text{C}\cdot\text{HF}$	-456.0	1
$\cdot\text{C}_2\text{H}_2\text{F}_3$, $\text{CH}_2\text{FC}\cdot\text{F}_2$	-449.8	1
$\cdot\text{C}_2\text{H}_2\text{F}_2\text{Cl}$, $\text{CF}_2\text{ClC}\cdot\text{H}_2$	-310.9 $\pm$ 7.0	1
$\cdot\text{C}_2\text{H}_3\text{F}_2$, $\text{CH}_3\text{C}\cdot\text{F}_2$	-302.5 $\pm$ 8.4	1
$\cdot\text{C}_2\text{H}_3\text{F}_2$, $\text{CHF}_2\text{C}\cdot\text{H}_2$	-285.8	1
$\cdot\text{C}_2\text{H}_3\text{F}_2$, $\text{CH}_2\text{FC}\cdot\text{HF}$	-238.5	1
$\cdot\text{C}_2\text{H}_4\text{F}$, $\text{CH}_3\text{C}\cdot\text{HF}$	-70.3 $\pm$ 8.4	1
$\cdot\text{C}_2\text{H}_4\text{F}$, $\text{CH}_2\text{FC}\cdot\text{H}_2$	-59.4 $\pm$ 8.4	1
$\cdot\text{C}_2\text{H}_2\text{F}_2\text{Cl}$, $\text{CF}_2\text{ClC}\cdot\text{H}_2$	-315.2 $\pm$ 6	1
$\cdot\text{C}_2\text{F}_4\text{Cl}$, $\text{CF}_2\text{ClC}\cdot\text{F}_2$	-686.0	1
$\cdot\text{C}_2\text{HF}_3\text{Cl}$, $\text{CClF}_2\text{C}\cdot\text{HF}$	-450.6 $\pm$ 12.6	1
$\cdot\text{C}_2\text{F}_4\text{Cl}$, $\text{CF}_3\text{C}\cdot\text{FCl}$	-728.0	1
$\cdot\text{C}_2\text{F}_3\text{Cl}_2$, $\text{CF}_3\text{C}\cdot\text{Cl}_2$	-564.0	1
$\cdot\text{C}_2\text{F}_3\text{ClBr}$, $\text{CF}_3\text{C}\cdot\text{ClBr}$	-504.2 $\pm$ 8.4	1
$\cdot\text{C}_2\text{Cl}$, $\text{ClC}\equiv\text{C}\cdot$	534 $\pm$ 50	1
$\cdot\text{C}_2\text{Cl}_3$, $\text{CCl}_2=\text{C}\cdot\text{Cl}$	190 $\pm$ 50	1
$\cdot\text{C}_2\text{Cl}_5$, $\text{CCl}_3\text{C}\cdot\text{Cl}_2$	35.1 $\pm$ 5.4	1
$\cdot\text{C}_2\text{HCl}_4$, $\text{CHCl}_2\text{C}\cdot\text{Cl}_2$	23.4 $\pm$ 8.4	1
$\cdot\text{C}_2\text{HCl}_4$, $\text{CCl}_3\text{C}\cdot\text{HCl}$	51.0	1
$\cdot\text{C}_2\text{H}_2\text{Cl}_3$, $\text{CH}_2\text{ClC}\cdot\text{Cl}_2$	26.4	1
$\cdot\text{C}_2\text{H}_2\text{Cl}_3$, $\text{CHCl}_2\text{C}\cdot\text{HCl}$	46.4	1
$\cdot\text{C}_2\text{H}_2\text{Cl}_3$, $\text{CCl}_3\text{C}\cdot\text{H}_2$	71.5 $\pm$ 8	1
$\cdot\text{C}_2\text{H}_3\text{Cl}_2$, $\text{CH}_3\text{C}\cdot\text{Cl}_2$	42.5 $\pm$ 1.7	1
$\cdot\text{C}_2\text{H}_3\text{Cl}_2$, $\text{CH}_2\text{ClC}\cdot\text{ClH}$	65.3	1
$\cdot\text{C}_2\text{H}_3\text{Cl}_2$, $\text{CHCl}_2\text{C}\cdot\text{H}_2$	90.1 $\pm$ 0.8	1
$\cdot\text{C}_2\text{H}_4\text{Cl}$, $\text{CH}_3\text{C}\cdot\text{HCl}$	76.5 $\pm$ 1.6	1
$\cdot\text{C}_2\text{H}_4\text{Cl}$, $\text{CH}_2\text{ClC}\cdot\text{H}_2$	93.0 $\pm$ 2.4	1
$\cdot\text{C}_2\text{H}_3\text{Br}_2$, $\text{CH}_3\text{C}\cdot\text{Br}_2$	140.2 $\pm$ 5.4	1
$\cdot\text{C}_2\text{H}_4\text{Br}$, $\text{BrCH}_2\text{C}\cdot\text{H}_2$	135.1	1
$\cdot\text{C}_2\text{H}_4\text{Br}$, $\text{CH}_3\text{C}\cdot\text{HBr}$	133.4 $\pm$ 3.4	3
$\cdot\text{C}_2\text{Br}$, $\text{CBrC}\cdot$	623.8	1
$\cdot\text{C}_2\text{Br}_3$, $\text{CBr}_2\text{C}\cdot\text{Br}$	385.3	1
$\cdot\text{C}_2\text{Br}_5$, $\text{CBr}_3\text{C}\cdot\text{Br}_2$	283.3	1
$\cdot\text{C}_3\text{H}_6\text{Cl}$, $\text{CH}_3\text{CH}_2\text{C}\cdot\text{HCl}$	56.6	1
$\cdot\text{C}_3\text{H}_6\text{Cl}$, $\text{CH}_3\text{C}\cdot\text{ClCH}_3$	29.9 $\pm$ 0.6	1
$\cdot\text{C}_3\text{H}_6\text{Br}$, $\text{C}\cdot\text{H}_2\text{CH}_2\text{CH}_2\text{Br}$	120.1 $\pm$ 1.3	1
$\cdot\text{C}_3\text{H}_6\text{Br}$, $\text{CH}_3\text{C}\cdot\text{HCH}_2\text{Br}$	96.7 $\pm$ 5.9	1
$\cdot\text{C}_3\text{H}_6\text{Br}$, $\text{CH}_3\text{CH}_2\text{C}\cdot\text{HBr}$	107.5 $\pm$ 2.5	1
$\cdot\text{C}_6\text{F}_5$	-547.7 $\pm$ 8.4	1
$\cdot\text{CH}_3\text{O}$, $\text{HOC}\cdot\text{H}_2$	-17.0 $\pm$ 0.7	1
$\cdot\text{CH}_2\text{ClO}$, $\text{HOC}\cdot\text{ClH}$	-60.7 $\pm$ 7.5	1
$\cdot\text{CHCl}_2\text{O}$, $\text{HOC}\cdot\text{Cl}_2$	-94.1 $\pm$ 7.5	1
$\cdot\text{CH}_2\text{ClO}$, $\text{ClOC}\cdot\text{H}_2$	135.6 $\pm$ 9.2	1
$\cdot\text{CH}_2\text{BrO}$, $\text{BrOC}\cdot\text{H}_2$	151 $\pm$ 16	1
$\cdot\text{C}_2\text{H}_3\text{O}$, $\text{C}\cdot\text{H}=\text{CHOH}$	121 $\pm$ 11	1
$\cdot\text{C}_2\text{H}_3\text{O}$, $\text{C}\cdot\text{H}_2\text{CHO}$	13.0 $\pm$ 2	1
$\cdot\text{C}_2\text{H}_5\text{O}$, $\text{CH}_3\text{C}\cdot\text{HOH}$	-54.0	1
$\cdot\text{C}_2\text{H}_4\text{ClO}$, $\text{CH}_3\text{C}\cdot\text{ClOH}$	-108.4 $\pm$ 8.8	1
$\cdot\text{C}_2\text{H}_4\text{ClO}$, $\text{C}\cdot\text{H}_2\text{CHClOH}$	-73.2 $\pm$ 8.8	1

Radical	$\Delta_f H^\circ_{298}/\text{kJ mol}^{-1}$	Ref.	Radical	$\Delta_f H^\circ_{298}/\text{kJ mol}^{-1}$	Ref.
$\cdot\text{C}_2\text{H}_3\text{Cl}_2\text{O}$, $\text{C}\cdot\text{H}_2\text{CCl}_2\text{OH}$	-99.6 ± 8.8	1	$\text{iPrC(O)C}\cdot(\text{CH}_3)_2$	-173.6 ± 20.9	1
$\cdot\text{C}_2\text{H}_5\text{O}$, $\text{C}\cdot\text{H}_2\text{CH}_2\text{OH}$	-31 ± 7	1	$\text{tC}_4\text{H}_9\text{C(O)C}\cdot\text{H}_2$	-115.5 ± 12.6	1
$\cdot\text{C}_2\text{H}_5\text{O}$, oxiran-2-yl	149.8 ± 6.3	1	$\text{PhC(O)C}\cdot\text{H}_2$	84.5 ± 12.6	1
$\cdot\text{C}_3\text{H}_5\text{O}$, $\text{CH}_2=\text{CHC}\cdot\text{HOH}$	0 ± 8.4	1	$\text{PhC(O)C}\cdot\text{HCH}_3$	41.4 ± 20.9	1
$\cdot\text{C}_3\text{H}_7\text{O}$, $\text{CH}_3\text{CH}_2\text{C}\cdot\text{HOH}$	-81 ± 4	1	$\text{PhC}\cdot\text{HC(O)CH}_2\text{Ph}$	134.3 ± 20.9	1
$\cdot\text{C}_3\text{H}_7\text{O}$, $(\text{CH}_3)\text{C}\cdot\text{HCH}_2\text{OH}$	-78.7 ± 8.4	1	$\text{PhC(O)OC}\cdot\text{H}_2$	-69.9	1
$\cdot\text{C}_3\text{H}_7\text{O}$, $\text{HOCH}_2\text{CH}_2\text{C}\cdot\text{H}_2$	-66.9 ± 8.4	1	$\cdot\text{C(O)OH-trans}$	$\geq -194.6 \pm 2.9$	1
$\cdot\text{C}_3\text{H}_7\text{O}$, $(\text{CH}_3)_2\text{C}\cdot\text{OH}$	-96.4	1	$\cdot\text{C(O)OH-cis}$	-219.7	1
$\cdot\text{C}_3\text{H}_7\text{O}$, $\cdot\text{CH}_2\text{CH(OH)CH}_3$	-62.8 ± 11.7	1	$\cdot\text{C(O)OCH}_3$	-161.5	1
$\cdot\text{C}_4\text{H}_9\text{O}$, $\cdot\text{CH}_2\text{C(OH)(CH}_3)_2$	-147.3 ± 8.4	1	$\text{C}\cdot\text{H}_2\text{C(O)OH}$	-248.9 ± 12.0	1
$\cdot\text{C}_2\text{H}_5\text{O}_3$, $\text{C}\cdot\text{H}_2\text{OCH}_2\text{OOH}$	109.6 ± 4.2	1	$\text{C}\cdot\text{H(CH}_3\text{)C(O)OH}$	-293 ± 3	1
$\text{PhCH}\cdot\text{OH}$	29.3 ± 8.4	1	$\text{C}\cdot\text{H}_2\text{C(O)OCH}_3$	-236.8 ± 8.4	1
$\text{Ph}_2\text{C}\cdot\text{OH}$	152.3 ± 6.3	1	$\text{C}\cdot\text{H}_2\text{C(O)OCH}_2\text{CH}_3$	-260.2 ± 12.6	1
$\cdot\text{C}_2\text{H}_5\text{O}$, $\text{CH}_3\text{OC}\cdot\text{H}_2$	0 ± 4.2	1	$\text{C}\cdot\text{H}_2\text{C(O)OPh}$	-28.0	1
$\cdot\text{C}_3\text{H}_7\text{O}$, $\text{CH}_3\text{OC}\cdot\text{HCH}_3$	-57.7 ± 8.4	1	$\cdot\text{C}_4\text{H}_7\text{O}$, tetrahydrofuran-2-yl	-18.0 ± 6.3	1
$\cdot\text{C}_3\text{H}_7\text{O}$, $\text{CH}_3\text{CH}_2\text{OC}\cdot\text{H}_2$	-45.2 ± 8.4	1	$\cdot\text{C}_4\text{H}_8\text{O}$, cyclopentanone-2-yl	-41.8 ± 12.6	1
$\cdot\text{C}_3\text{H}_7\text{O}$, $\text{C}\cdot\text{H}_2\text{CH}_2\text{OCH}_3$	-7.1 ± 4.2	1	$\cdot\text{C}_4\text{H}_7\text{O}_2$, 1,4-dioxan-2-yl	-131.8 ± 12.6	1
$\cdot\text{C}_4\text{H}_9\text{O}$, $(\text{CH}_3)_2\text{CHOC}\cdot\text{H}_2$	-70.3 ± 7.1	1	$\cdot\text{C}_7\text{H}_5\text{O}_2$, 2-C(O)OH- $\cdot\text{C}_6\text{H}_4$	-33.0	1
$\cdot\text{C}_4\text{H}_9\text{O}$, $\text{CH}_3\text{CH}_2\text{OC}\cdot\text{HCH}_3$	-81.2 ± 4.2	1	$\cdot\text{C}_7\text{H}_5\text{O}_2$, 3-C(O)OH- $\cdot\text{C}_6\text{H}_4$	-35.0	1
$\cdot\text{C}_4\text{H}_9\text{O}$, $\text{C}\cdot\text{H}_2\text{CH(CH}_3\text{)OCH}_3$	-42.3 ± 3.8	1	$\cdot\text{C}_7\text{H}_5\text{O}_2$, 4-C(O)OH- $\cdot\text{C}_6\text{H}_4$	-36.0	1
$\cdot\text{C}_4\text{H}_9\text{O}$, $(\text{CH}_3)_2\text{C}\cdot\text{OCH}_3$	-72.4 ± 10	1	$\cdot\text{CH}_3\text{O}_2$, $\text{C}\cdot\text{H}_2\text{OOH}$	66.1	1
$\cdot\text{C}_5\text{H}_{11}\text{O}$, $(\text{CH}_3)_3\text{COC}\cdot\text{H}_2$	-102.5 ± 8.4	1	$\cdot\text{C}_2\text{H}_5\text{O}_2$, $\text{C}\cdot\text{H}_2\text{CH}_2\text{OOH}$	46.0 ± 4.6	1
$\cdot\text{C}_2\text{H}_5\text{O}_2$, $\text{HOCH}_2\text{C}\cdot\text{HOH}$	-220.1 ± 8.4	1	$\cdot\text{C}_2\text{H}_5\text{O}_2$, $\text{CH}_3\text{CH}\cdot\text{OOH}$	26.9	1
$\text{C}\cdot\text{H}=\text{C}=\text{O}$, ketenyl	177.5 ± 8.8	1	$\cdot\text{C}_3\text{H}_7\text{O}_2$, $\text{CH}_2\text{CH}\cdot\text{CH}_2\text{OOH}$	10.9 ± 5.4	1
$\text{HC}\cdot(\text{O})$	42.5 ± 0.5	1	$\cdot\text{C}_3\text{H}_7\text{O}_2$, $\text{C}\cdot\text{H}_2\text{CH(OOH)CH}_3$	2.9 ± 6.3	1
$\text{C}\cdot\text{CO}$	381.2 ± 2.1	1	$\cdot\text{C}_4\text{H}_9\text{O}_2$, $(\text{CH}_3)_2\text{C}\cdot\text{CH}_2\text{OOH}$	-30.1 ± 5.4	1
$\text{CH}_3\text{C}\cdot(\text{O})$	-10.3 ± 1.8	1	$\cdot\text{C}_4\text{H}_9\text{O}_2$, $\text{C}\cdot\text{H}_2\text{C(CH}_3)_2\text{OOH}$	-26.8 ± 5.4	1
$\text{CF}_3\text{C}\cdot(\text{O})$	-608.7	1	$\cdot\text{C}_2\text{H}_3\text{O}_3$, $\text{C}\cdot\text{H}_2\text{C(O)OOH}$	-137.9	1
$\text{CH}_2\text{ClC}\cdot(\text{O})$	-21 ± 12.6	1	$\cdot\text{CHN}_2$	494.5	1
$\text{CHCl}_2\text{C}\cdot(\text{O})$	-17.6 ± 23	1	$\cdot\text{CH}_2\text{N}=\text{CH}_2$	263.6 ± 12.6	1
$\text{CCl}_3\text{C}\cdot(\text{O})$	-19.7	1	$\cdot\text{CH}_2\text{NH}_2$	151.9 ± 8.4	1
$\text{CH}_3\text{CH}_2\text{C}\cdot(\text{O})$	-31.7 ± 3.4	1	$\text{CH}_3\text{C}\cdot\text{HNH}_2$	111.7 ± 8.4	1
$\text{CH}_2\text{CHC}\cdot(\text{O})$	88.5	1	$(\text{CH}_3)_2\text{C}\cdot\text{NH}_2$	69.9 ± 8.4	1
$\text{CH}_2\text{C(CH}_3\text{)C}\cdot(\text{O})$	58.6 ± 16.7	1	$\cdot\text{CH}_2\text{NHCH}_3$	156.6	1
$\text{CH}_3\text{CH}_2\text{CH}_2\text{C}\cdot(\text{O})$	54.4 ± 4.2	1	$\cdot\text{CH}_2\text{N(CH}_3)_2$	148.0	1
$(\text{CH}_3)_2\text{CHC}\cdot(\text{O})$	-64.0 ± 3.8	1	$(\text{C}_2\text{H}_5)_2\text{NC}\cdot\text{HCH}_3$	68.6 ± 2.1	1
$(\text{CH}_3)_3\text{CC}\cdot(\text{O})$	-102.9 ± 6.3	1	$\cdot\text{CH}_2\text{N(CH}_3\text{)Ph}$	266.0 ± 12.6	1
$\text{C}_6\text{H}_5\text{C}\cdot(\text{O})$	116.3 ± 10.9	1	$\cdot\text{CN}$	439.3 ± 2.9	1
$\text{HC(O)CH}_2\cdot$	10.5 ± 9.2	1	$\cdot\text{CH}_2\text{CN}$	252.6 ± 4	1
$\text{ClC(O)CH}_2\cdot$	-52.7 ± 13	1	$\text{CH}_3\text{C}\cdot\text{HCN}$	226.7 ± 12.6	1
$\text{E}\cdot\text{C}\cdot\text{HCIC(O)H}$	-27.2 ± 10.5	1	$\cdot\text{CH}_2\text{CH}_2\text{CN}$	245.4 ± 12.6	1
$\text{Z}\cdot\text{C}\cdot\text{HCIC(O)H}$	-23.4 ± 10.5	1	$(\text{CH}_3)_2\text{C}\cdot\text{CN}$	190.4 ± 12.6	1
$\text{C}\cdot\text{Cl}_2\text{C(O)H}$	-55.6 ± 14.2	1	$\text{Ph(CH}_3\text{)C}\cdot\text{CN}$	248.5 ± 8.4	1
$\text{E}\cdot\text{C}\cdot\text{HCIC(O)Cl}$	-88.7 ± 15.1	1	$\text{NCC}\cdot\text{HCH}_2\text{CN}$	381.8 ± 12.6	1
$\text{C}\cdot\text{H}_2\text{C(O)F}$	-273.0 ± 5.8	1	$\cdot\text{CH}_2\text{NC}$	334.7 ± 16.7	1
$\text{Z}\cdot\text{C}\cdot\text{HCIC(O)Cl}$	-84.9 ± 13.8	1	$\cdot\text{C(O)NC}$	210.0 ± 10	1
$\text{C}\cdot\text{Cl}_2\text{C(O)Cl}$	-101.7 ± 15.5	1	$\cdot\text{C(O)NH}_2$	-15.1 ± 4	1
$\text{CH}_3\text{C(O)CH}_2\cdot$	-34 ± 3	1	$\text{C}\cdot\text{NN}$	569 ± 21	1
$\text{CH}_3\text{C(O)C}\cdot\text{HCH}_3$	-70.3 ± 7.1	1	$\text{HC}\cdot\text{NN}$	460 ± 8	1
$\text{CH}_3\text{C(O)C}\cdot=\text{CH}_2$	113.4	1	$\text{H}_2\text{C}\cdot\text{NN}$	292.5 ± 2.1	1
$\text{C}_2\text{H}_5\text{C(O)C}\cdot\text{HCH}_3$	-107.5 ± 20.9	1	$\cdot\text{CH}_2\text{NO}$	157 ± 4	1

Radical	$\Delta_f H^\circ_{298}/\text{kJ mol}^{-1}$	Ref.
CH_2NO_2	115.1 ± 12.6	1
$\text{CH}_3\text{C}^*\text{HNO}_2$	61.9 ± 12.6	1
$(\text{CH}_3)_2\text{C}^*\text{NO}_2$	6.3 ± 12.6	1
PhC^*HNO_2	169.0 ± 12.6	1
$\text{C}_6\text{H}_5\text{N}, 3\text{-NH}_2\text{-C}_6\text{H}_4$	320.1	1
$\text{C}_6\text{H}_5\text{N}, 4\text{-NH}_2\text{-C}_6\text{H}_4$	327.8	1
$\text{C}_6\text{H}_4\text{NO}_2, 3\text{-NO}_2\text{-C}_6\text{H}_4$	340.6 ± 10.0	1
$\text{C}_6\text{H}_4\text{NO}_2, 4\text{-NO}_2\text{-C}_6\text{H}_4$	302.7	1
$\text{C}_6\text{H}_4\text{CH}_3, 2\text{-Me-C}_6\text{H}_4$	315.1 ± 10.5	1
$\text{C}_6\text{H}_4\text{CH}_3, 4\text{-Me-C}_6\text{H}_4$	296.6 ± 9.6	1
$\text{C}_6\text{H}_3\text{N}_2\text{O}_4, 3,5\text{-(NO}_2)_2\text{-C}_6\text{H}_3$	305.4	1
$\text{C}_7\text{H}_6\text{NO}_2, 2\text{-Me-4-NO}_2\text{-C}_6\text{H}_3$	295.4 ± 8.4	1
$\text{C}_4\text{H}_3\text{N}, \text{pyrrol-2-yl}$	385.8	1
$\text{C}_4\text{H}_3\text{N}, \text{pyrrol-3-yl}$	385.8	1
$\text{C}_4\text{H}_8\text{N}, \text{pyrrolidin-2-yl}$	142.7 ± 12.6	1
$\text{C}_5\text{H}_4\text{N}, \text{pyrid-2-yl}$	362.0	1
$\text{C}_5\text{H}_4\text{N}, \text{pyrid-3-yl}$	391.0	1
$\text{C}_5\text{H}_4\text{N}, \text{pyrid-4-yl}$	391.0	1
$\text{C}_4\text{H}_7\text{N}_2, \text{piperad-2-yl}$	119.7	1
$\text{C}_4\text{H}_3\text{N}_2, \text{pyrazin-2-yl}$	409.2 ± 12.6	1
$\text{C}_4\text{H}_3\text{N}_2, \text{pyrimid-2-yl}$	388.0 ± 12.6	1
$\text{C}_4\text{H}_3\text{N}_2, \text{pyrimid-4-yl}$	409.0 ± 12.6	1
$\text{C}_4\text{H}_3\text{N}_2, \text{pyrimid-5-yl}$	446.4 ± 12.6	1
$\text{CH}(\text{NO}_2)_2$	139.1	1
$\text{C}(\text{NO}_2)_3$	201.2	1
$\text{CH}_2\text{C}(\text{NO}_2)_3$	150.6	1
$\text{CH}_2\text{CH}(\text{NO}_2)_2$	103.3	1
$\text{CH}_2\text{CH}_2\text{C}(\text{NO}_2)_3$	133.9	1
$\text{CH}_2\text{N}(\text{NO}_2)\text{CH}_2\text{C}(\text{NO}_2)_3$	173.6	1
$\text{CH}_2\text{N}(\text{NO}_2)\text{CH}_2\text{CH}(\text{NO}_2)_2$	126.4	1
$\text{CH}_2\text{CH}_2\text{N}(\text{NO}_2)\text{CH}_2\text{C}(\text{NO}_2)_3$	168.6	1
$\text{CH}_2\text{CH}_2\text{ONO}_2$	37.7	1
$\text{CH}_2(\text{ONO}_2)\text{CHCH}_2\text{ONO}_2$	-25.5	1
$\text{CH}(\text{CH}_2\text{ONO}_2)_2$	-57.3	1
$\text{CH}_2\text{C}(\text{CH}_2\text{ONO}_2)_3$	-158.2	1
CH_2NHNO_2	164.8	1
$\text{CH}_2\text{N}(\text{NO}_2)\text{CH}_3$	149.4	1
$\text{CH}_2\text{N}(\text{NO}_2)_2$	210.5	1
$\text{CH}_2\text{CH}_2\text{N}(\text{NO}_2)\text{CH}_3$	144.3	1
$\text{CH}_2\text{N}(\text{NO}_2)\text{CH}_2\text{N}(\text{NO}_2)\text{CH}_3$	202.1	1
$\text{CH}_2\text{N}(\text{NO}_2)(\text{CH}_2)\text{N}(\text{NO}_2)\text{CH}_3$	173.2	1
$\text{C}^*(\text{S})\text{H}$	300.4 ± 8.4	1
CH_2SH	151.9 ± 8.4	1
CH_2SCH_3	136.8 ± 5.9	1
CH_2SPh	268.6 ± 12.6	1
CH_2SOCH_3	23.8 ± 12.6	1
$\text{HOC}^*(\text{S})\text{S}$	110.5	1
$\text{CH}_2\text{SO}_2\text{CH}_3$	-177.0 ± 12.6	1
$\text{CH}_2\text{SO}_2\text{Ph}$	-57.3 ± 12.6	1
$\text{PhC}^*\text{HSO}_2\text{CH}_3$	-109.2 ± 12.6	1
$\text{PhC}^*\text{HSO}_2\text{Ph}$	7 ± 12.6	1

Radical	$\Delta_f H^\circ_{298}/\text{kJ mol}^{-1}$	Ref.
$\text{Ph}_2\text{C}^*\text{SO}_2\text{Ph}$	102 ± 12.6	1
$\text{Ph}_2\text{C}^*\text{SPh}$	435.6 ± 12.6	1
$\text{NC}^*(\text{O})$	127.2	1
CNH^*	207.9 ± 12.1	1
CNO^*	323 ± 30	1
CH_2SiMe_3	-32 ± 6	1
$\text{CH}_2\text{C}(\text{CH}_3)_2\text{SiMe}_3$	-125	1
CP^*	450 ± 9	1
(2) Oxygen-Centered Species		
HO^*	37.36 ± 0.13	1
FO^*	109 ± 10	1
ClO^*	101.63 ± 0.1	1
BrO^*	126.2 ± 1.7	1
IO^*	115.9 ± 5.0	1
HOO^*	12.30 ± 0.25	1
FOO^*	25.4 ± 2	1
ClOO^*	98.0 ± 4	1
BrOO^*	108 ± 40	1
IOO^*	96.6 ± 15	1
OFO^*	378.6 ± 20	1
OCIO^*	95.4	1
ClOOCIO^*	142 ± 12	1
ClCIO^*	90 ± 30	1
NCO^*	184.1	1
CNO^*	386.6	1
HONNO^*	172	1
sym-ClO_3	217.2 ± 21	1
HSO^*	-21.8 ± 2.1	1
HSOO^*	112	1
CH_3SOO^*	76	1
$\text{CF}_3\text{SO}_2\text{O}^*$	-912	1
NCO^*	184.0	1
O_2NO^*	73.7 ± 1.4	1
ONOO^*	82.8	1
$\text{HOS}(\text{O})_2\text{O}^*$	-511.7	1
CH_3O^*	21.0 ± 2.1	1
CF_3O^*	-635.1 ± 7.1	1
CCl_3O^*	-38.1 ± 9.2	1
CH_2ClO^*	-21.3 ± 9.2	1
CHCl_2O^*	-32.2 ± 9.2	1
$\text{CH}_2=\text{CH-O}^*$	18.4 ± 1.3	1
CF_3CHFO^*	-851.0	1
$\text{C}_2\text{H}_5\text{O}^*$	-13.6 ± 3.3	1
$\text{CH}_3\text{CHClO}^*$	-61.9 ± 12.1	1
$\text{CH}_3\text{CCl}_2\text{O}^*$	-91.6 ± 11.7	1
$\text{nC}_3\text{H}_7\text{O}^*$	-30.1 ± 8.4	1
$\text{iC}_3\text{H}_7\text{O}^*$	-48.5 ± 3.3	1
$(\text{CH}_3)_2\text{CClO}^*$	-108.4 ± 8.4	1
$\text{nC}_4\text{H}_9\text{O}^*$	-62.8	1
$\text{sC}_4\text{H}_9\text{O}^*$	-69.5	1
$\text{tC}_4\text{H}_9\text{O}^*$	-85.8 ± 3.8	1

Radical	$\Delta_f H^\circ_{298}/\text{kJ mol}^{-1}$	Ref.
$\text{CH}_2=\text{CHCH}_2\text{O}^\bullet$	87.0	1
$\text{C}_6\text{H}_5\text{O}^\bullet$	48.5 ± 2.9	1
$\text{o-Cl-C}_6\text{H}_4\text{O}^\bullet$	30.6	1
$\text{C}_6\text{Cl}_5\text{O}^\bullet$	~63	1
$\text{p-Cl-C}_6\text{H}_4\text{O}^\bullet$	~9	1
$\text{o-OH-C}_6\text{H}_4\text{O}^\bullet$	-186.3	1
$\text{p-OH-C}_6\text{H}_4\text{O}^\bullet$	-143.6	1
$\text{o-CH}_3\text{O-C}_6\text{H}_4\text{O}^\bullet$	-125.5	1
$\text{p-CH}_3\text{O-C}_6\text{H}_4\text{O}^\bullet$	-81.1	1
$\text{C}_6\text{H}_5\text{CH}_2\text{O}^\bullet$	136.0 ± 12.6	1
$\text{C}_{10}\text{H}_7\text{O}^\bullet$, naphthoxy-1	165.3	1
$\text{C}_{10}\text{H}_7\text{O}^\bullet$, naphthoxy-2	174.1	1
$\text{HC(O)O}^\bullet$	-129.7 ± 12.6	1
$\text{FC(O)O}^\bullet$	368.0	1
$\text{CH}_3\text{C(O)O}^\bullet$	-179.9 ± 12.6	1
$\text{CF}_3\text{C(O)O}^\bullet$	-797.0	1
$\text{CF}_3\text{OC(O)O}^\bullet$	-958.1 ± 16.7	1
$\text{C}_6\text{H}_5\text{C(O)O}^\bullet$	-50.2 ± 16.7	1
$\text{CH}_3\text{OO}^\bullet$	20.1 ± 5.1	1
$\text{C}_2\text{H}_3\text{OO}^\bullet$, $\text{CH}_2=\text{CHOO}^\bullet$	101.7 ± 1.7	1
$\text{C}_2\text{H}_5\text{OO}^\bullet$	-28.5 ± 9.6	1
$\text{C}_3\text{H}_5\text{OO}^\bullet$, $\text{CH}_2=\text{CHCH}_2\text{OO}^\bullet$	88.7	1
$\text{iC}_3\text{H}_7\text{OO}^\bullet$	-65.4 ± 11.3	1
$\text{C}_4\text{H}_7\text{OO}^\bullet$, $\text{CH}_3\text{CH}=\text{CHCH}_2\text{OO}^\bullet$	82.6 ± 5.3	1
$\text{tC}_4\text{H}_9\text{OO}^\bullet$	-101.5 ± 9.2	1
$\text{neo-C}_5\text{H}_{11}\text{OO}^\bullet$	-115.5	1
$\text{HOCH}_2\text{OO}^\bullet$	-162.1	1
$\text{HOOCH}_2\text{CH}_2\text{OO}^\bullet$	100	1
$\text{C}_6\text{H}_5\text{CH}_2\text{OO}^\bullet$	114.6 ± 4.2	1
$\text{c-C}_6\text{H}_{11}\text{OO}^\bullet$	-25.0 ± 10.5	1
$(\text{C}_2\text{H}_5)_2\text{N}(\text{CH}_3)\text{CHOO}^\bullet$	-36.0 ± 12.6	1
$\text{CF}_3\text{OO}^\bullet$	-635.0	1
$\text{CF}_2\text{ClOO}^\bullet$	-406.7 ± 14.6	1
$\text{CFCl}_2\text{OO}^\bullet$	-213.7	1
$\text{CH}_2\text{ClOO}^\bullet$	-5.1 ± 13.6	1
$\text{CHCl}_2\text{OO}^\bullet$	-19.2 ± 11.2	1
$\text{CCl}_3\text{OO}^\bullet$	-20.9 ± 8.9	1
$\text{CH}_3\text{CHClOO}^\bullet$	-54.7 ± 3.4	1
$\text{CH}_3\text{CCl}_2\text{OO}^\bullet$	-63.8 ± 9.8	1
$\text{CH}_3\text{OCH}_2\text{OO}^\bullet$	-142.2 ± 4.2	1
$\text{CH}_3\text{C(O)CH}_2\text{OO}^\bullet$	-142.1 ± 4	1
$\text{CH}_3\text{C(O)OO}^\bullet$	-154.4 ± 5.8	1
$\text{HOOO}^\bullet$	>12.84	4
$\text{CH}_3\text{OOO}^\bullet$	33.4 ± 12.6	1
$\text{C}_2\text{H}_5\text{OOO}^\bullet$	5.4 ± 12.6	1
(3) Nitrogen-Centered Species		
ON	91.04 ± 0.08	1
NO_2	33.97 ± 0.08	1
N_2O	82.05 ± 0.4	1
NH	357 ± 1	1
$\bullet\text{NH}_2$	186.2 ± 1.0	1

Radical	$\Delta_f H^\circ_{298}/\text{kJ mol}^{-1}$	Ref.
$\bullet\text{NNH}$	249.5	1
$\bullet\text{NCO}$	131.8	1
$\bullet\text{N}_3$	414.2 ± 20.9	1
$\bullet\text{N}_2\text{H}_3$	243.5	1
$(\text{Z})\text{-N}_2\text{H}_2$	213.0 ± 10.9	1
NF	209.2	1
$\bullet\text{NF}_2$	42.3 ± 8	1
$\bullet\text{NHF}$	112 ± 15	1
NBr	301 ± 21	1
HNO	107.1 ± 2.5	1
FNO	-65.7 ± 1.7	1
CINO	51.71 ± 0.42	1
BrNO	82.13 ± 0.8	1
INO	112.1 ± 20.9	1
NCO	120.9	1
NCN	464.8 ± 2.9	1
NSi	372 ± 63	1
$\text{NH}_2\text{C(O)N}^\bullet\text{H}$	0.8 ± 12.6	1
$\text{CH}_3\text{C(O)N}^\bullet\text{H}$	-6.7 ± 12.6	1
$\text{NH}_2\text{C(S)N}^\bullet\text{H}$	194 ± 12.6	1
$\text{CH}_3\text{C(S)N}^\bullet\text{H}$	173 ± 12.6	1
$\text{PhC(S)N}^\bullet\text{H}$	307 ± 12.6	1
HCON $^\bullet\text{H}$	49.8 ± 12.6	1
$\text{NH}_2\text{C(NH)N}^\bullet\text{H}$	250.6 ± 12.6	1
$\bullet\text{NHCN}$	319.2 ± 2.9	1
$\text{CH}_2\text{N}^\bullet\text{H}$	104.6 ± 12.6	1
$\text{CH}_3\text{N}^\bullet\text{H}$	184.1 ± 8.4	1
tBuN $^\bullet\text{H}$	95.4 ± 12.6	1
$\text{C}_6\text{H}_5\text{CH}_2\text{N}^\bullet\text{H}$	288.3 ± 12.6	1
$\text{C}_6\text{H}_5\text{N}^\bullet\text{H}$	244.3 ± 4.2	1
$(\text{CH}_3)_2\text{N}^\bullet$	158.2 ± 4.2	1
$(\text{C}_6\text{H}_5)(\text{CH}_3)\text{N}^\bullet$	241.0 ± 6.3	1
$(\text{C}_6\text{H}_5)_2\text{N}^\bullet$	366.0 ± 6.3	1
1-pyrrolyl	269.2 ± 12.6	1
1-pyrazolyl	413.0 ± 2.1	1
carbazol-9-yl	383.3 ± 8.4	1
$\text{CH}_3\text{N}_2^\bullet$	215.5 ± 7.5	1
$\text{C}_2\text{H}_5\text{N}_2^\bullet$	187.4 ± 10.5	1
$\text{iC}_3\text{H}_7\text{N}_2^\bullet$	146.0 ± 8.4	1
$\text{nC}_4\text{H}_9\text{N}_2^\bullet$	140.6 ± 8.4	1
$\text{tC}_4\text{H}_9\text{N}_2^\bullet$	97.5 ± 4.2	1
$(\text{NO}_2)\text{HN}^\bullet$	162.3	1
$(\text{CH}_3)(\text{NO}_2)\text{N}^\bullet$	139.0	1
$(\text{NO}_2)_2\text{N}^\bullet$	200.0	1
$\text{CH}_3\text{N}^\bullet\text{CH}_2\text{N}(\text{NO}_2)\text{CH}_3$	185.4	1
(4) Sulfur-Centered Species		
HOS $^\bullet$	-6.7 ± 2.1	1
HC(O)S $^\bullet$	56.5	1
HS $^\bullet\text{O}_2$	-221.8	1
HOS $^\bullet\text{O}_2$	-384.9	1
NCS $^\bullet$	300 ± 8	1

Radical	$\Delta_f H^\circ_{298}/\text{kJ mol}^{-1}$	Ref.	Radical	$\Delta_f H^\circ_{298}/\text{kJ mol}^{-1}$	Ref.
HS•	143.0 ± 0.8	1	H ₃ SiSi•H ₂	234 ± 6	1
CH ₃ S•	124.7 ± 1.7	1	C ₆ H ₅ Si•H ₂	274	1
C ₂ H ₅ S•	101	1	H ₃ SiSi•H	312 ± 8	1
nC ₃ H ₇ S•	80	1	MeSi•	302.2	1
iC ₃ H ₇ S•	74.9 ± 8.4	1	MeSi•H	202 ± 6	1
tC ₄ H ₉ S•	43.9 ± 8.4	1	Me ₂ Si•	135 ± 8	1
C ₆ H ₅ S•	242.7 ± 4.6	1	SiN	313.8 ± 42	1
C ₆ Cl ₅ S•	~184	1	•GeH ₃	221.8 ± 8.4	1
C ₆ H ₅ CH ₂ S•	246	1	GeF	-71 ± 10	1
CH ₃ S•O	-67 ± 10	1	GeF ₂	-574 ± 20	1
CH ₃ S•O ₂	-239.3	1	•GeF ₃	-807 ± 50	1
HSS•	115.5 ± 14.6	1	GeCl	69 ± 18	1
CH ₃ SS•	68.6 ± 8.4	1	GeCl ₂	-171 ± 5	1
C ₂ H ₅ SS•	43.5 ± 8.4	1	•GeCl ₃	-268 ± 50	1
iC ₃ H ₇ SS•	13.8 ± 8.4	1	GeBr	137 ± 5	1
tC ₄ H ₉ SS•	-19.2 ± 8.4	1	GeBr ₂	-61 ± 5	1
HOC(S)S•	110.5 ± 4.6	1	•GeBr ₃	-119 ± 50	1
HC(O)S•	56.5	1	GeI	211 ± 25	1
SF	13.0 ± 6.3	1	GeI ₂	50.2 ± 4	1
SF ₂	-296.7 ± 16.7	1	•GeI ₃	42 ± 50	1
SF ₃	-503.0 ± 33.5	1	SnF	-95 ± 7.2	1
SF ₄	-763.2 ± 20.9	1	SnF ₂	-511 ± 9.2	1
SF ₅	-879.9 ± 15.1	1	•SnF ₃	-647 ± 50	1
ClS•	156.5 ± 16.7	1	SnCl	35 ± 12	1
SN	263.6 ± 105	1	SnCl ₂	-202.6 ± 7.1	1
SCl	156.5 ± 16.7	1	•SnCl ₃	-292 ± 50	1
(5) Si-, Ge-, Sn-, Pb-Centered Species			SnBr	76 ± 12	1
SiF	-20.1 ± 12.6	1	SnBr ₂	-119 ± 2.8	1
SiF ₂	-638 ± 6	1	•SnBr ₃	-159 ± 50	1
•SiF ₃	-987 ± 20	1	SnI	173 ± 12	1
SiCl	198.3 ± 6.7	1	SnI ₂	-8.1 ± 4.2	1
SiCl ₂	-169 ± 3	1	•SnI ₃	-8 ± 50	1
•SiCl ₃	321 ± 8	6	•Sn(CH ₃) ₃	132.2	1
SiBr	235 ± 46	1	•Sn(C ₆ H ₅) ₃	518.8 ± 21	1
SiBr ₂	46 ± 8	1	PbH	236.2 ± 19.2	1
•SiBr ₃	-201.7 ± 63	1	PbF	-80.3 ± 10.5	1
SiI	313.8 ± 42	1	PbF ₂	-435.1 ± 8.4	1
SiI ₂	92.5 ± 8.4	1	•PbF ₃	-490 ± 60	1
•SiI ₃	35.3 ± 63	1	PbCl	15.1 ± 50	1
SiH	376.6 ± 8.4	1	PbCl ₂	-174.1 ± 1.3	1
SiH ₂ (¹ A ₁)	273 ± 2	1	•PbCl ₃	-178 ± 80	1
SiH ₂ (³ B ₁)	360.7	1	PbBr	70.9 ± 42	1
•SiH ₃	200.4 ± 2.5	1	PbBr ₂	-104.4 ± 6.3	1
MeSi•H ₂	141 ± 6	1	•PbBr ₃	-104 ± 80	1
Me ₂ Si•H	78 ± 6	1	PbI	107.4 ± 37.7	1
Me ₃ Si•	15 ± 7	1	PbI ₂	-3.2 ± 4.2	1
•Si ₂ H ₃	~402	1	•PbI ₃	22 ± 80	1

References

1. Luo, Y. R. *Comprehensive Handbook of Chemical Bond Energies*, CRC Press, Boca, Raton, FL, 2007.
2. Wheeler, S. E., Robertson, K. A., Allen, W. D., Schaefer III, H. F., Bomble, Y. J., and Stanton, J. F., *J. Phys. Chem. A* 111, 3819, 2007.
3. Seetula, J. A., and Eskola, A. J., *Chem. Phys.* 351, 141, 2008.
4. Denis, P. A., and Ornellas, F. R., *J. Phys. Chem. A* 113, 499, 2009.
5. Gao, Y., DeYonker, N. J., Garrett III, E. C., Wilson, A. K., Cundari, T. R., and Marshall, P., *J. Phys. Chem. A* 113, 6955, 2009.
6. Shuman, N. S., Spencer, A. P., and Baer, T., *J. Phys. Chem. A* 113, 9458, 2009.

TABLE 5. Bond Dissociation Energies of Some Organic Molecules

D_{298}° (R-X)/ kJ mol⁻¹ of some organic compounds are listed below. All data are from Tables 1 and 3.

	X=H	F	Cl	Br	I	OH	OCH ₃	NH ₂	NO	CH ₃	COCH ₃	CF ₃	CCl ₃
R=H	435.7799	569.658	431.361	366.16	298.26	497.10	440.2	450.08	199.5	439.3	374.0	445.2	392.5
CH ₃	439.3	460.2	350.2	294.1	238.9	384.93	351.9	356.1	172.0	377.4	351.9	429.3	362.3
C ₂ H ₅	420.5	447.4	352.3	292.9	233.5	391.2	355.2	352.3	171.5	370.3	347.3	—	—
i-C ₃ H ₇	410.5	483.8	354.0	299.2	234.7	397.9	360.7	357.7	152.7	369.0	340.2	—	—
t-C ₄ H ₉	400.4	495.8	351.9	292.9	227.2	398.3	353.1	355.6	167	363.6	329.3	—	—
C ₆ H ₅	472.2	525.5	399.6	336.4	272.0	463.6	418.8	429.3	226.8	426.8	406.7	463.2	388.7
C ₆ H ₅ CH ₂	375.5	412.8	299.9	239.3	187.8	334.1	—	306.7	123	325.1	299.7	365.7	—
CCl ₃	392.5	439.3	296.6	231.4	168	—	—	—	125	362.3	—	332.2	285.8
CF ₃	445.2	546.8	365.3	296.2	227.2	≤482.0	—	—	167	429.3	—	413.0	332.2
C ₂ F ₅	429.7	532.2	346.0	283.3	219.2	—	—	—	—	—	—	424.3	—
CH ₃ CO	374.0	511.7	354.0	292.0	223.0	459.4	424.3	414.6	—	351.9	307.1	—	—
CN	528.5	482.8	422.6	364.8	320.1	—	—	—	204.4	521.7	—	469.0	—
C ₆ F ₅	487.4	485	383.3	~328	<301.7	446.9	—	—	211.3	439.3	—	435.1	—

TABLE 6. Bond Dissociation Energies in Diatomic Cations

From thermochemistry, we have

$$D_{298}^{\circ}(\text{A}^{+}\text{--B}) \equiv \Delta_f H^{\circ}(\text{A}^{+}) + \Delta_f H^{\circ}(\text{B}) - \Delta_f H^{\circ}(\text{AB}^{+}) = D_{298}^{\circ}(\text{A--B}) + IP(\text{A}) - IP(\text{AB})$$

Thus, $D_{298}^{\circ}(\text{A}^{+}\text{--B})$ may be derived using the Table 1 and the ionization potentials of species A and AB. The following Table has been arranged in an alphabetical order of the atoms. The **boldface** in the species indicates the dissociated fragment.

A ⁺ –B	D_{298}° kJ/mol ⁻¹	Ref.	A ⁺ –B	D_{298}° kJ/mol ⁻¹	Ref.	A ⁺ –B	D_{298}° kJ/mol ⁻¹	Ref.
Ag ⁺ –Ag	167.9 ± 8.7	1	Au ⁺ –Be	401 ± 29	1	Be ⁺ –Ar	49.0 ± 2.4	1
Ag ⁺ –Cl	32 ± 30	1	Au ⁺ –C	311.5 ± 7.7	4	Be ⁺ –Au	410 ± 29	1
Ag ⁺ –F	24 ± 27	1	Au ⁺ –F	79	1	Be ⁺ –Be	196 ± 0.5	8
Ag ⁺ –H	43.5 ± 5.9	1	Au ⁺ –Ge	292 ± 24	1	Be ⁺ –Cl	417 ± 50	1
Ag ⁺ –O	123 ± 5	1	Au ⁺ –H	213.1 ± 7.7	4	Be ⁺ –F	575 ± 98	1
Ag ⁺ –S	123 ± 13	1	Au ⁺ –I	230~280	1	Be ⁺ –H	307.3 ± 5.0	1
Al ⁺ –Al	121	1	Au ⁺ –Xe	130 ± 13	1	Be ⁺ –O	362.0 ± 6.2	1
Al ⁺ –Ar	15.47	1	B ⁺ –Ar	32.7	1	Bi ⁺ –Bi	199 ± 10	1
Al ⁺ –Ca	148.5	1	B ⁺ –B	187	1	Bi ⁺ –O	174	1
Al ⁺ –Cl	173 ± 42	1	B ⁺ –Br	164 ± 21	1	Bi ⁺ –S	179 ± 50	1
Al ⁺ –F	314 ± 21	1	B ⁺ –C	284 ± 58	1	Bi ⁺ –Se	184 ± 29	1
Al ⁺ –Kr	5.54	1	B ⁺ –Cl	308 ± 21	1	Bi ⁺ –Te	125 ± 50	1
Al ⁺ –O	166.7 ± 12.0	1	B ⁺ –F	460 ± 10	1	Bi ⁺ –Tl	100 ± 42	1
Al ⁺ –Se	114 ± 49	1	B ⁺ –H	198 ± 5	1	Bk ⁺ –O	610	1
Ar ⁺ –Ar	130.323 ± 0.087	1	B ⁺ –O	326 ± 48	1	Br ⁺ –Br	318.858 ± 0.024	1
Ar ⁺ –He	2.9 ± 0.8	1	B ⁺ –Pt	314 ± 98	1	Br ⁺ –C	451.5 ± 8.6	1
Ar ⁺ –Ne	7.5 ± 0.8	1	B ⁺ –Se	298 ± 98	1	Br ⁺ –Cl	303.000 ± 0.048	1
As ⁺ –As	364 ± 22	1	B ⁺ –Si	365 ± 15	1	Br ⁺ –F	251.5 ± 12.6	1
As ⁺ –H	290.8 ± 3.0	1	Ba ⁺ –Ar	11.85	1	Br ⁺ –H	379.26 ± 2.89	1
As ⁺ –O	495	1	Ba ⁺ –Br	418 ± 10	1	Br ⁺ –O	365.7 ± 3.1	1
As ⁺ –P	367 ± 59	1	Ba ⁺ –Cl	468.2 ± 10	1	C ⁺ –Ar	72.3	1
As ⁺ –S	433.2 ± 12.5	1	Ba ⁺ –D	245.2 ± 9.6	1	C ⁺ –Br	398 ± 8.6	1
Au ⁺ –Al	170 ± 30	1	Ba ⁺ –F	640 ± 29	1	C ⁺ –C	601.9 ± 19.3	1
Au ⁺ –Au	234.5	1	Ba ⁺ –I	335 ± 10	1	C ⁺ –Cl	614	1
Au ⁺ –B	329 ± 50	1	Ba ⁺ –O	441.4 ± 15	1	C ⁺ –F	721 ± 40	1

A ⁺ -B	D ₂₉₈ ^o kJ/mol ⁻¹	Ref.
C ⁺ -H	397.848 ± 0.013	1
C ⁺ -N	524.5 ± 4.2	1
C ⁺ -O	810.7 ± 0.8	1
C ⁺ -P	587 ± 50	1
C ⁺ -S	706.6 ± 2.1	1
C ⁺ -Se	587 ± 50	1
Ca ⁺ -Al	144.7	1
Ca ⁺ -Ar	12.99 ± 0.60	1
Ca ⁺ -Au	306 ± 29	1
Ca ⁺ -Br	417.6 ± 10	1
Ca ⁺ -Ca	104.1	1
Ca ⁺ -Cl	433.4 ± 12	1
Ca ⁺ -F	556.5 ± 8.4	1
Ca ⁺ -H	284.2 ± 10	1
Ca ⁺ -I	293.7 ± 10.8	1
Ca ⁺ -Kr	18.60 ± 0.72	1
Ca ⁺ -Ne	4.95 ± 0.06	1
Ca ⁺ -O	348 ± 5	1
Ca ⁺ -Xe	25.38 ± 0.96	1
Cd ⁺ -Cd	122.5 ± 10	1
Cd ⁺ -H	179.5	1
Ce ⁺ -Au	278 ± 34	1
Ce ⁺ -Br	341.0	1
Ce ⁺ -C	254 ± 96	1
Ce ⁺ -Ce	207 ± 42	1
Ce ⁺ -Cl	429.5	1
Ce ⁺ -F	586 ± 63	1
Ce ⁺ -I	295.5	1
Ce ⁺ -Ir	530 ± 96	1
Ce ⁺ -N	494 ± 63	1
Ce ⁺ -O	852 ± 15	1
Ce ⁺ -Pd	255 ± 53	1
Ce ⁺ -Pt	467 ± 96	1
Ce ⁺ -Rh	423 ± 96	1
Ce ⁺ -S	524 ± 59	1
Cl ⁺ -Ar	169	1
Cl ⁺ -Cl	385.746 ± 0.096	6
Cl ⁺ -D	457.284 ± 0.017	1
Cl ⁺ -F	291 ± 10	1
Cl ⁺ -H	452.714 ± 0.018	1
Cl ⁺ -N	650 ± 10	1
Cm ⁺ -O	670 ± 40	7
Cl ⁺ -O	468.0 ± 2.1	1
Co ⁺ -Ar	52.89 ± 0.06	1
Co ⁺ -Br	>289	1
Co ⁺ -C	351 ± 29	1
Co ⁺ -Cl	285 ± 12	1
Co ⁺ -Co	269	1
Co ⁺ -D	199.6 ± 5.8	1
Co ⁺ -H	195 ± 6	1
Co ⁺ -He	16.4 ± 0.4	1

A ⁺ -B	D ₂₉₈ ^o kJ/mol ⁻¹	Ref.
Co ⁺ -I	211.7 ± 8.4	1
Co ⁺ -Kr	68.37 ± 0.18	1
Co ⁺ -Ne	12.8 ± 0.4	1
Co ⁺ -O	317.3 ± 4.8	1
Co ⁺ -S	288.3 ± 8.7	1
Co ⁺ -Si	317.1 ± 6.7	1
Co ⁺ -Xe	85.7 ± 6.8	1
Cr ⁺ -Ar	31.7 ± 3.9	1
Cr ⁺ -C	277 ± 24	1
Cr ⁺ -Cl	>211	1
Cr ⁺ -Cr	129	1
Cr ⁺ -D	135 ± 9	1
Cr ⁺ -F	279 ± 42	1
Cr ⁺ -H	136 ± 9	1
Cr ⁺ -He	7.8 ± 0.4	1
Cr ⁺ -Ne	9.5 ± 0.4	1
Cr ⁺ -O	359	1
Cr ⁺ -S	258.6 ± 16.4	1
Cr ⁺ -Si	203 ± 15	1
Cr ⁺ -Xe	71.9 ± 10.0	1
Cs ⁺ -Ar	8.2	1
Cs ⁺ -Br	60.5 ± 10	1
Cs ⁺ -Cl	107.4 ± 10	1
Cs ⁺ -Cs	62.6 ± 9.6	1
Cs ⁺ -F	43.7 ± 10	1
Cs ⁺ -He	5.1	1
Cs ⁺ -I	29.3 ± 10	1
Cs ⁺ -Kr	15.1	1
Cs ⁺ -Na	48.1 ± 4.2	1
Cs ⁺ -Ne	6.11	1
Cs ⁺ -O	59	1
Cs ⁺ -Rb	68.3 ± 10	1
Cs ⁺ -Xe	14.7	1
Cu ⁺ -Ar	51.9 ± 6.8	1
Cu ⁺ -Cl	91 ± 10	1
Cu ⁺ -Cu	155.2 ± 7.7	1
Cu ⁺ -F	117 ± 21	1
Cu ⁺ -Ge	231 ± 23	1
Cu ⁺ -H	93 ± 13	1
Cu ⁺ -Kr	24.3 ± 0.8	1
Cu ⁺ -O	133.9 ± 11.6	1
Cu ⁺ -S	203.3 ± 14.5	1
Cu ⁺ -Si	260 ± 8	1
Cu ⁺ -Xe	102.1 ± 5.8	1
D ⁺ -D	263.4405 ± 0.0003	1
Dy ⁺ -Br	324.2	1
Dy ⁺ -Cl	407.9	1
Dy ⁺ -Cu	196 ± 42	1
Dy ⁺ -F	535 ± 24	1
Dy ⁺ -I	279.9	1
Dy ⁺ -O	597 ± 15	1

A ⁺ -B	D ₂₉₈ ^o kJ/mol ⁻¹	Ref.
Er ⁺ -Br	315.8	1
Er ⁺ -Cl	406.7	1
Er ⁺ -F	546 ± 34	1
Er ⁺ -I	271.6	1
Er ⁺ -O	583 ± 15	1
Es ⁺ -O	470 ± 60	1
Eu ⁺ -Ag	85 ± 50	1
Eu ⁺ -Au	252 ± 97	1
Eu ⁺ -Br	333.8	1
Eu ⁺ -Cl	430.7	1
Eu ⁺ -F	543 ± 29	1
Eu ⁺ -I	290.7	1
Eu ⁺ -O	393 ± 15	1
Eu ⁺ -S	257 ± 32	1
F ⁺ -Ar	161.1	1
F ⁺ -F	325.393 ± 0.096	1
F ⁺ -He	181.62 ± 0.08	1
F ⁺ -Kr	152.4	1
F ⁺ -Xe	188	1
Fe ⁺ -Ar	14.2 ± 7.7	1
Fe ⁺ -Br	>293	1
Fe ⁺ -C	356.1 ± 17.2	1
Fe ⁺ -Cl	>343	1
Fe ⁺ -Co	259 ± 21	1
Fe ⁺ -Cr	209 ± 29	1
Fe ⁺ -Cu	222 ± 29	1
Fe ⁺ -D	227	1
Fe ⁺ -F	360 – 423	1
Fe ⁺ -Fe	272	1
Fe ⁺ -H	211.2 ± 9.6	1
Fe ⁺ -I	>239	1
Fe ⁺ -Kr	33.5 ± 6.7	1
Fe ⁺ -N	485	1
Fe ⁺ -Nb	285 ± 21	1
Fe ⁺ -Ni	268 ± 21	1
Fe ⁺ -O	334 ± 6	9
Fe ⁺ -S	295.2 ± 5.8	1
Fe ⁺ -Sc	200 ± 21	1
Fe ⁺ -Si	277 ± 9	1
Fe ⁺ -Ta	301 ± 21	1
Fe ⁺ -Ti	251 ± 25	1
Fe ⁺ -V	314 ± 21	1
Fe ⁺ -Xe	46.0 ± 5.8	1
Ga ⁺ -Bi	62 ± 98	1
Ga ⁺ -Br	56.5 ± 16	1
Ga ⁺ -Cl	86 ± 21	1
Ga ⁺ -F	136 ± 15	1
Ga ⁺ -Ga	126.3	1
Ga ⁺ -I	41.6 ± 15	1
Ga ⁺ -O	46 ± 50	1
Ga ⁺ -Sb	38 ± 96	1

A ⁺ –B	D ₂₉₈ ^o kJ/mol ⁻¹	Ref.
Ga ⁺ –Te	19 ± 29	1
Gd ⁺ –Cd	122.5 ± 10	1
Gd ⁺ –H	179.5	1
Ge ⁺ –Br	398 ± 42	1
Ge ⁺ –C	223 ± 31	1
Ge ⁺ –Cl	473 ± 50	1
Ge ⁺ –F	565 ± 21	1
Ge ⁺ –Ge	274 ± 10	1
Ge ⁺ –H	377 ± 84	1
Ge ⁺ –O	344 ± 21	1
Ge ⁺ –S	283 ± 21	1
Ge ⁺ –Se	234 ± 10	1
Ge ⁺ –Si	268 ± 21	1
Ge ⁺ –Te	233 ± 19	1
H ⁺ –D	261.1021 ± 0.0002	1
H ⁺ –H	259.4659 ± 0.0002	1
He ⁺ –H	123.9	1
He ⁺ –He	229.687 ± 0.019	1
Hf ⁺ –C	311.5 ± 2.9	10
Hf ⁺ –H	193.8 ± 10.6	2
Hf ⁺ –O	670.4 ± 10.6	10
Hg ⁺ –Ar	22.2 ± 1.2	1
Hg ⁺ –H	207	1
Hg ⁺ –Hg	134	1
Hg ⁺ –Kr	37.9 ± 1.3	1
Hg ⁺ –Xe	72.2 ± 1.3	1
Ho ⁺ –Ag	155 ± 61	1
Ho ⁺ –Au	250 ± 60	1
Ho ⁺ –Br	320.6	1
Ho ⁺ –Cl	410.3	1
Ho ⁺ –Cu	214 ± 35	1
Ho ⁺ –F	542 ± 50	1
Ho ⁺ –Ho	88 ± 96	1
Ho ⁺ –I	270.4	1
Ho ⁺ –O	551 ± 25	1
I ⁺ –Br	184.90 ± 0.02	1
I ⁺ –Cl	247.5 ± 0.4	1
I ⁺ –F	262.9 ± 2.1	1
I ⁺ –H	304.70 ± 0.10	1
I ⁺ –I	262.90 ± 0.04	1
I ⁺ –O	316.3 ± 10.5	1
In ⁺ –Br	65.2 ± 12.6	1
In ⁺ –Cl	193 ± 21	1
In ⁺ –F	148 ± 50	1
In ⁺ –I	51.5 ± 21	1
In ⁺ –In	81 ± 30	1
In ⁺ –S	171 ± 50	1
In ⁺ –Sb	73 ± 50	1
In ⁺ –Se	118 ± 50	1
In ⁺ –Te	41 ± 50	1
Ir ⁺ –C	635.8 ± 4.8	3

A ⁺ –B	D ₂₉₈ ^o kJ/mol ⁻¹	Ref.
Ir ⁺ –D	302.8 ± 5.8	1
Ir ⁺ –H	305.7 ± 5.8	1
Ir ⁺ –O	247	1
K ⁺ –Ar	14 ± 7	1
K ⁺ –Br	35.7 ± 10.5	1
K ⁺ –Cl	51 ± 19	1
K ⁺ –He	6.00	1
K ⁺ –I	18 ± 45	1
K ⁺ –K	83.86 ± 0.15	1
K ⁺ –Kr	15.8	1
K ⁺ –Li	59.9 ± 5.9	1
K ⁺ –Na	58.69 ± 0.08	1
K ⁺ –Ne	7.79	1
K ⁺ –O	13	1
K ⁺ –Xe	19.5	1
Kr ⁺ –Ar	55.31 ± 0.14	1
Kr ⁺ –H	464	1
Kr ⁺ –He	2.1 ± 0.8	1
Kr ⁺ –Kr	110.967 ± 0.033	1
Kr ⁺ –N	136.9 ± 13	1
Kr ⁺ –Ne	3.8 ± 0.8	1
La ⁺ –Au	436 ± 97	1
La ⁺ –Br	425.9	1
La ⁺ –C	427 ± 33	1
La ⁺ –Cl	503.6	1
La ⁺ –F	589 ± 34	1
La ⁺ –H	243 ± 9	1
La ⁺ –I	392.4	1
La ⁺ –Ir	356 ± 97	1
La ⁺ –O	875 ± 25	1
La ⁺ –Pt	522 ± 78	1
La ⁺ –Rh	345 ± 97	1
La ⁺ –S	629 ± 96	1
La ⁺ –Si	277.0 ± 9.6	1
Li ⁺ –Ar	33 ± 14	1
Li ⁺ –Bi	91 ± 50	1
Li ⁺ –Br	41.8 ± 10.6	1
Li ⁺ –Cl	66 ± 15	1
Li ⁺ –F	7 ± 21	1
Li ⁺ –He	10.66	1
Li ⁺ –I	51.1 ± 6.3	1
Li ⁺ –Kr	48.1	1
Li ⁺ –Li	137.3 ± 6.3	1
Li ⁺ –Ne	15.32	1
Li ⁺ –O	38.9 ± 9.6	1
Li ⁺ –Sb	129.6 ± 13.9	1
Li ⁺ –Xe	56.4	1
Lu ⁺ –Br	86.1	1
Lu ⁺ –Cl	180.6	1
Lu ⁺ –F	376.8	1
Lu ⁺ –H	204 ± 15	1

A ⁺ –B	D ₂₉₈ ^o kJ/mol ⁻¹	Ref.
Lu ⁺ –I	40.7	1
Lu ⁺ –O	524 ± 15	1
Lu ⁺ –Si	107 ± 13	1
Mg ⁺ –Ar	19.20	1
Mg ⁺ –Au	267 ± 29	1
Mg ⁺ –Cl	327 ± 6.5	1
Mg ⁺ –D	203.6 ± 0.8	1
Mg ⁺ –F	477 ± 50	1
Mg ⁺ –H	190.8 ± 5.8	1
Mg ⁺ –Kr	25.39	1
Mg ⁺ –Mg	125	1
Mg ⁺ –Ne	4.9 ± 0.6	1
Mg ⁺ –O	245.2 ± 10	1
Mg ⁺ –Xe	53.74	1
Mn ⁺ –Cl	>211	1
Mn ⁺ –F	321 ± 24	1
Mn ⁺ –H	202.5 ± 5.9	1
Mn ⁺ –I	>211	1
Mn ⁺ –Mn	129	1
Mn ⁺ –O	285 ± 13	1
Mn ⁺ –S	247 ± 23	1
Mn ⁺ –Se	165 ± 50	1
Mo ⁺ –C	442.7 ± 13.5	1
Mo ⁺ –F	376 ± 29	1
Mo ⁺ –H	170 ± 6	1
Mo ⁺ –Mo	449.4 ± 1.0	1
Mo ⁺ –O	488.2 ± 1.9	1
Mo ⁺ –S	355.1 ± 5.8	1
Mo ⁺ –Xe	>53.1 ± 6.8	1
N ⁺ –Ar	208.4 ± 9.6	1
N ⁺ –F	584 ± 42	1
N ⁺ –H	≥435.67 ± 0.77	1
N ⁺ –N	843.85 ± 0.10	1
N ⁺ –O	115	1
Na ⁺ –Ar	19 ± 8	1
Na ⁺ –Br	58.2 ± 10.6	1
Na ⁺ –Cl	20.3 ± 10	1
Na ⁺ –He	7.55	1
Na ⁺ –I	64.9 ± 3.0	1
Na ⁺ –Kr	~24.9	1
Na ⁺ –Li	95.8 ± 3.9	1
Na ⁺ –Na	98.64 ± 0.29	1
Na ⁺ –Na	6.4	1
Na ⁺ –Ne	~9.04	1
Na ⁺ –O	37 ± 19	1
Na ⁺ –Xe	~28.6	1
Nb ⁺ –Ar	40.87 ± 0.13	1
Nb ⁺ –C	509 ± 15	1
Nb ⁺ –Fe	>251	1
Nb ⁺ –H	220 ± 7	1
Nb ⁺ –Nb	576.8 ± 9.6	1

A ⁺ -B	D ₂₉₈ ^o kJ/mol ⁻¹	Ref.	A ⁺ -B	D ₂₉₈ ^o kJ/mol ⁻¹	Ref.	A ⁺ -B	D ₂₉₈ ^o kJ/mol ⁻¹	Ref.
Nb ⁺ -O	688 ± 11	1	Pb ⁺ -Se	169.4 ± 6.3	1	S ⁺ -O	524.3 ± 0.4	1
Nb ⁺ -S	501.7 ± 20.3	1	Pb ⁺ -Te	163 ± 63	1	S ⁺ -P	573 ± 21	1
Nb ⁺ -V	404.7 ± 0.2	1	Pd ⁺ -C	528 ± 5	1	S ⁺ -S	522.4 ± 0.5	1
Nb ⁺ -Xe	73.28 ± 0.12	1	Pd ⁺ -H	208.4 ± 8.7	1	Sc ⁺ -C	326 ± 6	1
Nd ⁺ -Au	267 ± 84	1	Pd ⁺ -O	145 ± 11	1	Sc ⁺ -Cl	410 ± 42	1
Nd ⁺ -Br	352.9	1	Pd ⁺ -Pd	197 ± 29	1	Sc ⁺ -F	605 ± 32	1
Nd ⁺ -Cl	441.4	1	Pd ⁺ -S	197 ± 6	1	Sc ⁺ -Fe	201 ± 21	1
Nd ⁺ -F	309.6	1	Pd ⁺ -Si	289 ± 50	1	Sc ⁺ -H	235 ± 8	1
Nd ⁺ -I	596 ± 32	1	Pr ⁺ -Au	317 ± 81	1	Sc ⁺ -O	689 ± 5	1
Nd ⁺ -O	753 ± 15	1	Pr ⁺ -Br	357.7	1	Sc ⁺ -S	529.7 ± 17.4	1
Ne ⁺ -H	1239	1	Pr ⁺ -Cl	445.0	1	Sc ⁺ -Se	475.8 ± 8.4	1
Ne ⁺ -He	13.0 ± 0.8	1	Pr ⁺ -F	557 ± 63	1	Sc ⁺ -Si	242.3 ± 10.5	1
Ne ⁺ -Ne	125.29 ± 1.93	1	Pr ⁺ -I	317.0	1	Se ⁺ -F	364 ± 42	1
Ni ⁺ -Ar	53.9	1	Pr ⁺ -O	796 ± 15	1	Se ⁺ -H	304	1
Ni ⁺ -Br	>289	1	Pt ⁺ -Ar	36.4 ± 8.7	1	Se ⁺ -P	514 ± 25	1
Ni ⁺ -C	418	1	Pt ⁺ -B	398 ± 105	1	Se ⁺ -S	392 ± 19	1
Ni ⁺ -Cl	192 ± 4	1	Pt ⁺ -C	530.5 ± 4.8	1	Se ⁺ -Se	413 ± 19	1
Ni ⁺ -D	166.0 ± 7.7	1	Pt ⁺ -Cl	249.8 ± 14.5	1	Si ⁺ -Au	175 ± 50	1
Ni ⁺ -F	≥456	1	Pt ⁺ -H	275 ± 5	1	Si ⁺ -B	351 ± 15	1
Ni ⁺ -H	158.1 ± 7.7	1	Pt ⁺ -N	326.9 ± 9.6	1	Si ⁺ -Br	276 ± 96	1
Ni ⁺ -He	12.4 ± 0.4	1	Pt ⁺ -O	318.4 ± 6.7	1	Si ⁺ -C	365 ± 50	1
Ni ⁺ -I	>297	1	Pt ⁺ -Pt	318 ± 23	1	Si ⁺ -Cl	591.0 ± 0.6	1
Ni ⁺ -Ne	9.9 ± 0.4	1	Pt ⁺ -Si	515 ± 50	1	Si ⁺ -F	684.1 ± 5.4	1
Ni ⁺ -Ni	208	1	Pt ⁺ -Xe	86.6 ± 28.9	1	Si ⁺ -H	316.6 ± 2.1	1
Ni ⁺ -O	275.9 ± 7.7	1	Pu ⁺ -F	562 ± 50	1	Si ⁺ -O	478 ± 13.4	1
Ni ⁺ -S	241.0 ± 3.9	1	Pu ⁺ -O	655	1	Si ⁺ -P	272 ± 50	1
Ni ⁺ -Si	326 ± 6.7	1	Rb ⁺ -Ar	12.0	1	Si ⁺ -Pd	237 ± 50	1
Np ⁺ -F	730 ± 100	1	Rb ⁺ -Br	17.6v5.1	1	Si ⁺ -Pt	525 ± 50	1
Np ⁺ -O	≥752	1	Rb ⁺ -Cl	10.5 ± 10.5	1	Si ⁺ -S	387.5 ± 6.0	1
O ⁺ -Ar	33.8	1	Rb ⁺ -I	27 ± 42	1	Si ⁺ -Si	334 ± 19	1
O ⁺ -F	301.8 ± 8.4	1	Rb ⁺ -Kr	14.9	1	Si ⁺ -Te	347 ± 50	1
O ⁺ -H	487.9 ± 0.34	1	Rb ⁺ -Na	50.1 ± 3.9	1	Sm ⁺ -Br	343.3	1
O ⁺ -N	1050.64 ± 0.13	1	Rb ⁺ -Ne	6.95	1	Sm ⁺ -Cl	435.4	1
O ⁺ -O	647.75 ± 0.17	1	Rb ⁺ -O	29	1	Sm ⁺ -F	620.9	1
Os ⁺ -H	238.9	1	Rb ⁺ -Rb	75.6 ± 9.6	1	Sm ⁺ -I	299.1	1
Os ⁺ -O	418 ± 50	1	Rb ⁺ -Xe	21.5	1	Sm ⁺ -O	569 ± 15	1
P ⁺ -C	512 ± 42	1	Re ⁺ -C	497.7 ± 3.9	1	Sn ⁺ -Br	335 ± 50	1
P ⁺ -Cl	289	1	Re ⁺ -H	224.7 ± 6.7	1	Sn ⁺ -Cu	184 ± 96	1
P ⁺ -F	490.6 ± 8.4	1	Re ⁺ -O	435 ± 59	1	Sn ⁺ -F	364 ± 29	1
P ⁺ -H	329.6 ± 2.1	1	Rh ⁺ -C	414 ± 17	1	Sn ⁺ -O	281 ± 10	1
P ⁺ -N	483 ± 21	1	Rh ⁺ -H	164.8 ± 3.8	1	Sn ⁺ -S	240 ± 19	1
P ⁺ -O	791.3 ± 8.4	1	Rh ⁺ -O	295.0 ± 5.8	1	Sn ⁺ -Se	174 ± 6.3	1
P ⁺ -P	481 ± 50	1	Rh ⁺ -S	226 ± 13	1	Sn ⁺ -Sn	193	1
P ⁺ -S	606 ± 34	1	Ru ⁺ -C	453.5 ± 10.6	1	Sn ⁺ -Te	168.7 ± 8.4	1
Pa ⁺ -O	~800	1	Ru ⁺ -H	160.2 ± 5.0	1	Sr ⁺ -Ar	13.32 ± 2.92	1
Pb ⁺ -Br	260 ± 63	1	Ru ⁺ -O	372 ± 5	1	Sr ⁺ -Br	378.1 ± 8.4	1
Pb ⁺ -Cl	285 ± 63	1	Ru ⁺ -S	288 ± 6	1	Sr ⁺ -Cl	427 ± 8.4	1
Pb ⁺ -F	347 ± 32	1	S ⁺ -C	620.8 ± 1.3	1	Sr ⁺ -F	615 ± 50	1
Pb ⁺ -O	247 ± 8.4	1	S ⁺ -F	343.5 ± 4.8	1	Sr ⁺ -H	209 ± 5	1
Pb ⁺ -Pb	214 ± 29	1	S ⁺ -H	348.2 ± 1.7	1	Sr ⁺ -I	308.2	1
Pb ⁺ -S	293 ± 50	1	S ⁺ -N	516 ± 34	1	Sr ⁺ -Kr	18.13 ± 6.94	1

A ⁺ -B	D ₂₉₈ ^o kJ/mol ⁻¹	Ref.	A ⁺ -B	D ₂₉₈ ^o kJ/mol ⁻¹	Ref.	A ⁺ -B	D ₂₉₈ ^o kJ/mol ⁻¹	Ref.
Sr ⁺ -Ne	4.52 ± 9.6	1	Tl ⁺ -I	133 ± 21	1	Xe ⁺ -H	355	1
Sr ⁺ -O	298.7	1	Tl ⁺ -Tl	22 ± 50	1	Xe ⁺ -Kr	41.65 ± 0.08	1
Sr ⁺ -Sr	108.5 ± 1.6	1	Tm ⁺ -Br	312.2	1	Xe ⁺ -N	66.4 ± 9.6	1
Ta ⁺ -C	369.4 ± 3.9	10	Tm ⁺ -Cl	407.9	1	Xe ⁺ -Ne	2.1 ± 0.8	1
Ta ⁺ -H	230 ± 6	1	Tm ⁺ -F	537 ± 16	1	Xe ⁺ -Xe	99.6	1
Ta ⁺ -O	688.7 ± 11.6	10	Tm ⁺ -I	266.8	1	Y ⁺ -C	281 ± 12	1
Ta ⁺ -Ta	666	1	Tm ⁺ -O	482 ± 15	1	Y ⁺ -F	677 ± 21	1
Tb ⁺ -Cu	245 ± 34	1	U ⁺ -Br	345 ± 29	1	Y ⁺ -H	260.5 ± 5.8	1
Tb ⁺ -O	722 ± 15	1	U ⁺ -C	300 ± 96	1	Y ⁺ -O	718 ± 25	1
Tc ⁺ -H	197.5	1	U ⁺ -Cl	431 ± 34	1	Y ⁺ -Pt	466 ± 192	1
Tc ⁺ -O	>167	1	U ⁺ -D	283.4 ± 9.6	1	Y ⁺ -S	533.9 ± 8	1
Te ⁺ -H	305 ± 12	1	U ⁺ -F	668 ± 29	1	Y ⁺ -Si	243 ± 13	1
Te ⁺ -O	339 ± 50	1	U ⁺ -H	284 ± 8	1	Y ⁺ -Te	360 ± 96	1
Te ⁺ -P	415 ± 97	1	U ⁺ -N	~485	1	Y ⁺ -Y	281 ± 21	1
Te ⁺ -Se	342 ± 19	1	U ⁺ -O	757 ± 42	1	Yb ⁺ -Br	307.4	1
Te ⁺ -Si	339.6	5	U ⁺ -P	186	1	Yb ⁺ -Cl	399.6	1
Te ⁺ -Te	278 ± 29	1	U ⁺ -S	518 ± 29	1	Yb ⁺ -F	557.5 ± 14.4	1
Th ⁺ -Cl	499 ± 29	1	V ⁺ -Ar	39.39 ± 0.12	1	Yb ⁺ -I	262.0	1
Th ⁺ -F	682 ± 29	1	V ⁺ -C	373 ± 13.5	1	Yb ⁺ -O	376 ± 15	1
Th ⁺ -O	875 ± 16	1	V ⁺ -D	202 ± 6	1	Yb ⁺ -Yb	238 ± 96	1
Th ⁺ -Pt	388 ± 193	1	V ⁺ -Fe	314 ± 21	1	Zn ⁺ -Ar	28.7 ± 1.2	1
Th ⁺ -Rh	504 ± 67	1	V ⁺ -H	202 ± 6	1	Zn ⁺ -H	216 ± 15	1
Ti ⁺ -C	395 ± 23	1	V ⁺ -Kr	49.46 ± 0.18	1	Zn ⁺ -O	161.1 ± 4.8	1
Ti ⁺ -Cl	426.8	1	V ⁺ -N	448.6 ± 5.8	1	Zn ⁺ -S	198 ± 12	1
Ti ⁺ -F	≥456	1	V ⁺ -Nb	403.5 ± 0.2	1	Zn ⁺ -Si	274.1 ± 9.6	1
Ti ⁺ -H	226.6 ± 10.6	1	V ⁺ -O	581.6 ± 9.6	1	Zn ⁺ -Zn	60 ± 19	1
Ti ⁺ -N	501 ± 13	1	V ⁺ -S	358.9 ± 8.7	1	Zr ⁺ -Ar	36.09 ± 0.24	1
Ti ⁺ -O	667 ± 7	1	V ⁺ -Si	229 ± 15	1	Zr ⁺ -C	445.8 ± 15.4	1
Ti ⁺ -Pt	82 ± 96	1	V ⁺ -V	302	1	Zr ⁺ -H	218.8 ± 9.6	1
Ti ⁺ -S	461.1 ± 6.8	1	V ⁺ -Xe	66.4 ± 0.6	1	Zr ⁺ -N	443 ± 46	1
Ti ⁺ -Si	249 ± 16	1	W ⁺ -C	463.0 ± 8.7	10	Zr ⁺ -O	753 ± 11	1
Ti ⁺ -Ti	229	1	W ⁺ -F	444 ± 96	1	Zr ⁺ -S	549.0 ± 9.6	1
Tl ⁺ -Br	52 ± 50	1	W ⁺ -H	222.5 ± 5	1	Zr ⁺ -Zr	407.0 ± 9.6	1
Tl ⁺ -Cl	26 ± 4	1	W ⁺ -O	656.9 ± 6.8	10			
Tl ⁺ -F	13 ± 21	1	Xe ⁺ -Ar	13.4	1			

References

1. Luo, Y. R., *Comprehensive Handbook of Chemical Bond Energies*, CRC Press, Boca, Raton, 2007.
2. Parke, L. G., Hinton, C. S., and Armentrout, P. B., *Int. J. Mass Spectrom.* 254, 168, 2006.
3. Li, F.-X., Zhang, X.-G., and Armentrout, P. B., *Int. J. Mass Spectrom.* 255/256, 279, 2006.
4. Li, F.-X., and Armentrout, P. B., *J. Chem. Phys.* 125, 133114/1, 2006.
5. Chattopadhyaya, S., Pramanik, A., Banerjee, A., and Das, K. K., *J. Phys. Chem. A* 110, 12303, 2006.
6. Li, J., Hao, Y., Yang, J., Zhou, C., and Mo, Y., *J. Chem. Phys.* 127, 104307/1, 2007.
7. Gibson, J. K., Haire, R. G., Santos, M., Pires de Matos, A., and Marçalo, J., *J. Phys. Chem. A* 112, 11373, 2008.
8. Merritt, J. M., Kaledin, A. L., Bondybey, V. E., and Heaven, M. C., *Phys. Chem. Chem. Phys.* 10, 4006, 2008.
9. Schröder, D., *J. Phys. Chem. A* 112, 13215, 2008.
10. Hinton, C. S., Li, F.-X., and Armentrout, P. B., *Int. J. Mass Spectrom.* 280, 226, 2009.

TABLE 7. Bond Dissociation Energies in Polyatomic Cations

This Table has been arranged on the basis of the Periodic Table with the IUPAC notation for Groups 1 to 18, see inside front cover of this *Handbook*. The **boldface** in the species indicates the dissociated fragment.

Bond	$Do_{98}^2/\text{kJ mol}^{-1}$	Ref.	Bond	$Do_{98}^2/\text{kJ mol}^{-1}$	Ref.
(1) Group 1			(2) Group 2		
Li ⁺ –H ₂	27.2	1	K ⁺ –adenine	95.1 ± 3.2	1
Li ⁺ –CO	57 ± 13	1	K ⁺ –indole	104.6 ± 12.6	1
Li ⁺ –H ₂ O	139 ± 8	1	K ⁺ –Phe (phenylalanine)	150.5 ± 5.8	1
Li ⁺ –NH ₃	156 ± 8	1	K ⁺ –Tyr (tyrosine)	165.0 ± 5.8	1
Li ⁺ –CH ₄	130	1	Rb ⁺ –H ₂ O	66.9 ± 12.6	1
Li ⁺ –CH ₃ OH	156 ± 8	1	Rb ⁺ –NH ₃	78.2	1
Li ⁺ –CH ₃ OCH ₃	167 ± 10	1	Rb ⁺ –CH ₃ CN	86.6 ± 1.3	1
Li ⁺ –pyridine	183.0 ± 14.5	1	Rb ⁺ –C ₆ H ₅ OH	70.2 ± 3.7	1
Li ⁺ –Gly (glycine)	220 ± 9	1	Cs ⁺ –H ₂ O	57.3	1
Na ⁺ –H ₂	10.4 ± 0.8	1	Cs ⁺ –C ₆ H ₅ NH ₂	70.8 ± 4.5	1
Na ⁺ –N ₂	33.5	1	(2) Group 2		
Na ⁺ –CO	31 ± 8	1	CH₃Be ⁺ –CH ₃	192.9 ± 13.4	1
Na ⁺ –CO ₂	66.5	1	<i>tert</i> -C(CH ₃) ₃ Be ⁺ – <i>tert</i> -C(CH ₃) ₃	121.8 ± 13.4	1
Na ⁺ –SO ₂	79.1	1	Mg ⁺ –OH	314 ± 33	1
Na ⁺ –O ₃	52.3	1	Mg ⁺ –CO	43.1 ± 5.8	1
Na ⁺ –H ₂ O	91.2 ± 6.3	1	Mg ⁺ –CO ₂	58.4 ± 5.8	1
Na ⁺ (H ₂ O)–H ₂ O	82.0 ± 5.8	1	Mg ⁺ –H ₂ O	122.5 ± 12.5	1
Na ⁺ (H ₂ O) ₂ –H ₂ O	66.1	1	Mg ⁺ –NH ₃	158.9 ± 11.6	1
Na ⁺ (H ₂ O) ₃ –H ₂ O	52.7 ± 0.8	1	Mg ⁺ –CH ₄	29.8 ± 6.8	1
Na ⁺ (glycine)–H ₂ O	75.1 ± 5.3	1	Mg ⁺ –MeOH	147.6 ± 6.8	1
Na ⁺ (glutamine)–H ₂ O	52 ± 1	1	Mg ⁺ –C ₆ H ₆	155.2	1
Na ⁺ –NH ₃	106.2 ± 5.4	1	Mg ⁺ –pyridine	200.0 ± 6.4	1
Na ⁺ –HNO ₃	86.2	1	Mg ⁺ –imidazole	243.9 ± 10.4	1
Na ⁺ –CH ₄	30.1	1	Mg ²⁺ (H ₂ O) ₅ –H ₂ O	101.3	1
Na ⁺ –CH ₃ OH	98.8 ± 5.7	1	Mg ²⁺ (Me ₂ CO) ₅ –Me ₂ CO	93.3	1
Na ⁺ –CH ₃ CN	125.5 ± 9.6	1	Ca ⁺ –OH	435.1 ± 14.5	1
Na ⁺ –C ₂ H ₄	44.6 ± 4.4	1	Ca ⁺ –H ₂ O	117.2	1
Na ⁺ –CH ₃ OCH ₃	101.4 ± 5.7	1	Ca ⁺ –C ₆ H ₆	134	1
Na ⁺ –CH ₃ C(O)H	114.4 ± 3.4	1	Ca ⁺ –imidazole	186.3 ± 3.9	1
Na ⁺ –MeCOMe	131.3 ± 4.1	1	Ca ²⁺ (H ₂ O) ₄ –H ₂ O	110.0 ± 5.9	1
Na ⁺ –C ₆ H ₆	97.0 ± 5.9	1	Ca ²⁺ (Me ₂ CO) ₅ –Me ₂ CO	101.3	1
Na ⁺ –pyrrole	103.7 ± 4.8	1	Sr ⁺ –CO	20.3	1
Na ⁺ –Gly (glycine)	166.7 ± 5.1	1	Sr ⁺ –CO ₂	41.9	1
Na ⁺ –Ala (alanine)	167 ± 4	1	Sr ⁺ –H ₂ O	144.3	1
Na ⁺ –GlyGly (glycylglycine)	203 ± 8	1	Sr ⁺ –C ₆ H ₆	117	1
K ⁺ –H ₂	6.1 ± 0.8	1	Sr ²⁺ (H ₂ O) ₅ –H ₂ O	87.4	1
K ⁺ –CO ₂	35.6	1	Ba ⁺ –OH	530.7 ± 19.3	1
K ⁺ –H ₂ O	74.9	1	Ba ²⁺ (H ₂ O) ₄ –H ₂ O	90.8	1
K ⁺ (H ₂ O) ₂ –H ₂ O	67.4	1	(3) Group 3		
K ⁺ (H ₂ O) ₃ –H ₂ O	55.2	1	Sc ⁺ –H ₂	23.0 ± 1.3	1
K ⁺ (H ₂ O) ₄ –H ₂ O	11.8	1	Sc ⁺ –CH ₂	412 ± 22	1
K ⁺ (H ₂ O) ₅ –H ₂ O	44.8	1	Sc ⁺ –CH ₃	233 ± 10	1
K ⁺ (H ₂ O) ₆ –H ₂ O	41.8	1	Sc ⁺ –C ₂ H ₂	240 ± 20	1
K ⁺ –NH ₃	79 ± 7	1	Sc ⁺ –C ₂ H ₄	≥131	1
K ⁺ –C ₆ H ₆	80.3	1	Sc ⁺ –C ₆ H ₆	222 ± 21	1
			Sc ⁺ –H ₂ O	131	1

Bond	$Do_{98}^2/\text{kJ mol}^{-1}$	Ref.	Bond	$Do_{98}^2/\text{kJ mol}^{-1}$	Ref.
Sc ⁺ -NH	483 ± 10	1	V ⁺ -CH	470 ± 5	1
Sc ⁺ -NH ₂	347 ± 5	1	V ⁺ -CH ₂	326 ± 6	1
Sc ⁺ -pyridine	231.5 ± 10.3	1	V ⁺ -CH ₃	193 ± 7	1
Y ⁺ -CH ₂	398 ± 13	1	V ⁺ -C ₂ H ₂	172 ± 8	1
Y ⁺ -CH ₃	249 ± 5.0	1	V ⁺ -C ₂ H ₄	124 ± 8	1
Y ⁺ -C ₂ H ₂	218 ± 13	1	V ⁺ -(η^5 -C ₅ H ₅)	530.7	1
Y ⁺ -C ₂ H ₄	>138	1	V ⁺ -C ₆ H ₆	234 ± 10	1
Y ⁺ -CO	29.9 ± 10.6	1	V ⁺ -CO	114.8 ± 2.9	1
Y ⁺ -CS	137.0 ± 7.7	1	V ⁺ -CO ₂	72.4 ± 3.8	1
Y ⁺ (O)-CO ₂	86 ± 5	1	V ⁺ -H ₂ O	149.8 ± 5.0	1
La ⁺ -CH	523 ± 33	1	V ⁺ -NH	423 ± 29	1
La ⁺ -CH ₂	401 ± 7	1	V ⁺ -NH ₂	293 ± 6	1
La ⁺ -CH ₃	217 ± 15	1	V ⁺ -NH ₃	192 ± 11	1
La ⁺ -C ₂ H ₂	262 ± 30	1	V ⁺ -pyridine	218.7 ± 13.5	1
La ⁺ -C ₂ H ₄	192.5	1	V ⁺ -imidazole	≤243.4 ± 8.0	1
Lu ⁺ -CH ₂	>230 ± 6	1	Nb ⁺ -H ₂	61.9	1
Lu ⁺ -CH ₃	176 ± 20	1	Nb ⁺ -CH	581 ± 19	1
U ⁺ (F)-F	552 ± 44	1	Nb ⁺ -CH ₂	428.4 ± 8.7	1
U ⁺ (F) ₂ -F	523 ± 38	1	Nb ⁺ -CH ₃	198.8 ± 10.6	1
U ⁺ (F) ₃ -F	381 ± 19	1	Nb ⁺ -CH ₃ NH ₂	134	1
U ⁺ (F) ₄ -F	243 ± 17	1	Nb ⁺ -C ₃ H ₆	117.7	1
U ⁺ (F) ₅ -F	26 ± 11	1	(NbFe) ⁺ -C ₃ H ₄	>163	1
(4) Group 4			Nb ⁺ -CO	95.5 ± 4.8	1
Ti ⁺ -CH	478 ± 5	1	Nb ⁺ -CS	242.2 ± 10.6	1
Ti ⁺ -CH ₂	391 ± 15	1	Nb ₇ ⁺ -N ₂	<215	1
Ti ⁺ -CH ₃	213.8 ± 3	1	Ta ⁺ -CH	561.5 ± 15.4	6
Ti ⁺ -CH ₄	70.3 ± 2.5	1	Ta ⁺ -CH ₂	464.1 ± 2.9	6
Ti ⁺ -C ₂ H ₂	213 ± 13	1	Ta ⁺ -CH ₃	259.5 ± 13.5	6
Ti ⁺ -C ₂ H ₄	146 ± 11	1	Ta ⁺ -C ₆ H ₆	251~301	1
Ti ⁺ -C ₆ H ₆	259 ± 9	1	(6) Group 6		
Ti ⁺ -CO	117.7 ± 5.8	1	(CO) ₆ Cr ⁺ -H	230 ± 10	1
Ti ⁺ -H ₂ O	157.7 ± 5.9	1	(η^5 -C ₅ H ₅)(NO)(CO) ₂ Cr ⁺ -H	207.1 ± 14	1
Ti ⁺ -NH	466 ± 12	1	Cr ⁺ -H ₂	31.8 ± 2.1	1
Ti ⁺ -NH ₂	356 ± 13	1	Cr ⁺ -CH	294 ± 29	1
Ti ⁺ -NH ₃	197 ± 7	1	Cr ⁺ -CH ₂	216 ± 4	1
Ti ⁺ -pyridine	217.2 ± 9.3	1	Cr ⁺ -CH ₃	110 ± 4	1
Ti ⁺ -imidazole	≤232.4 ± 8.2	1	Cr ⁺ -C ₆ H ₆	170 ± 10	1
Zr ⁺ -CH	568 ± 13	1	Cr ⁺ -indole	196.6 ± 16.7	1
Zr ⁺ -CH ₂	444.8 ± 5	1	Cr ⁺ -CO	89.7 ± 5.8	1
Zr ⁺ -CH ₃	227.7 ± 9.6	1	Cr ⁺ -OH	298 ± 14	1
Zr ⁺ -C ₂ H ₂	273 ± 14	1	Cr ⁺ -H ₂ O	132.6 ± 8.8	1
Zr ⁺ -CO	77 ± 10	1	Cr ⁺ -N ₂	59 ± 4	1
Zr ⁺ -CS	257.6 ± 10.6	1	Cr ⁺ -NH ₃	183 ± 10	1
Hf ⁺ -CH	492.1 ± 14.5	2	(CO) ₆ Mo ⁺ -H	260 ± 9	1
Hf ⁺ -CH ₂	421.6 ± 6.8	2	Mo ⁺ -CH	513.3 ± 13.5	1
Hf ⁺ -CH ₃	204.5 ± 25.1	2	Mo ⁺ -CH ₂	344.4 ± 10	1
Hf ⁺ -C ₂ H ₂	150.6	1	Mo ⁺ -CH ₃	151.5 ± 8.7	1
(5) Group 5			Mo ⁺ -CO	193.9 ± 9.6	1
(CO) ₆ V ⁺ -H	220 ± 14	1	Mo ⁺ -CO ₂	49.2 ± 7	1
V ⁺ -H ₂	42.7 ± 2.1	1	Mo ⁺ -CS	162 ± 18	1
			Mo ⁺ -CS ₂	67.5 ± 12.5	1

Bond	$Do_{98}^2/\text{kJ mol}^{-1}$	Ref.
Mo^+-NH	<385	1
$\text{Mo}^+-\text{pyrrole}$	>289	1
$(\text{CO})_6\text{W}^+-\text{H}$	257 ± 9	1
W^+-CH	580 ± 27	1
W^+-CH_2	456.4 ± 5.8	1
W^+-CH_3	$\sim 222.9 \pm 9.6$	1
$(\text{PMe}_3)_3(\text{CO})_3\text{W}^+-\text{H}$	259.4	1
$\text{W}^+-\text{pyrrole}$	>209	1
(7) Group 7		
$(\text{CO})_5\text{Mn}^+-\text{H}$	172 ± 10	1
Mn^+-H_2	7.9 ± 1.7	1
Mn^+-CH_2	295 ± 13	1
Mn^+-CH_3	215 ± 10	1
$\text{Mn}^+(\text{CO})_5-\text{CH}_3$	132 ± 15	1
$\text{Mn}^+(\text{CO})_5-\text{CH}_4$	>30	1
$\text{Mn}^+-(\eta^5-\text{C}_5\text{H}_5)$	326.1 ± 9.6	1
$\text{Mn}^+-\text{C}_6\text{H}_6$	145 ± 10	1
Mn^+-OH	332 ± 24	1
Mn^+-CO	25 ± 10	1
$\text{Mn}^+-\text{H}_2\text{O}$	121.8 ± 5.9	1
$\text{Mn}^+-\text{CH}_3\text{OH}$	134 ± 29	1
$\text{Mn}^+-\text{OC}(\text{CH}_3)_2$	159 ± 14	1
Mn^+-CS	80.0 ± 21	1
Mn^+-NH_2	254 ± 20	1
Mn^+-NH_3	147 ± 8	1
Tc^+-CH_2	<464	1
$\text{Tc}^+-\text{C}_2\text{H}_2$	<320	1
$\text{Re}^+(\text{CH}_3)(\text{CO})_5-\text{H}$	294 ± 13	1
$(\text{PMe}_3)(\text{CO})_2\text{Re}^+-\text{H}$	300.4	1
(8) Group 8		
$\text{Fe}^+(\text{O})-\text{H}$	444 ± 17	1
$\text{Fe}^+(\text{CO})-\text{H}$	120 ± 23	1
$\text{Fe}^+(\text{H}_2\text{O})-\text{H}$	215 ± 14	1
$\text{Fe}^+(\eta^5-\text{C}_5\text{H}_5)-\text{H}$	193 ± 21	1
$(\text{CO})_5\text{Fe}^+-\text{H}$	299 ± 15	1
Fe^+-H_2	45.2 ± 2.5	1
Fe^+-CH	423 ± 29	1
Fe^+-CH_2	$\leq 342 \pm 2$	1
Fe^+-CH_3	229 ± 5	1
Fe^+-CH_4	73.2	1
$\text{Fe}^+-\text{C}_2\text{H}_2$	159.0 ± 2.1	1
$\text{Fe}^+-\text{C}_2\text{H}_3$	238 ± 10	1
$\text{Fe}^+-\text{C}_2\text{H}_4$	145 ± 11	1
$\text{Fe}^+-\text{C}_2\text{H}_5$	233 ± 9	1
$\text{Fe}^+-\text{C}_2\text{H}_6$	64 ± 6	1
Fe^+-OH	366 ± 12	1
Fe^+-CO	129.3 ± 3.9	1
$\text{Fe}^+\text{D}-\text{CO}$	53 ± 13	1
Fe^+-CO_2	74.3 ± 7.7	1
$\text{Fe}^+-\text{H}_2\text{O}$	128.9 ± 0.8	1

Bond	$Do_{98}^2/\text{kJ mol}^{-1}$	Ref.
Fe^+-N_2	53 ± 4	1
Fe^+-NH_3	184 ± 12	1
Fe^+-CS_2	166.1 ± 4.6	1
$\text{Fe}^+-\text{imidazole}$	246.1 ± 13.8	1
Fe^+-SiH	254 ± 13	1
Fe^+-SiH_2	181 ± 9	1
Fe^+-SiH_3	183 ± 9	1
$\text{Ru}^+(\eta^5-\text{C}_5\text{H}_5)_2-\text{H}$	292 ± 16	1
$(\eta^5-\text{C}_5\text{Me}_5)_2\text{Ru}^+-\text{H}$	284.5	1
Ru^+-CH	501.7 ± 11.6	1
Ru^+-CH_2	344.4 ± 4.8	1
Ru^+-CH_3	160.2 ± 5.8	1
Ru^+-CS	253 ± 20	1
OsO_4^+-H	552 ± 13	1
(9) Group 9		
$(\eta^5-\text{C}_5\text{H}_5)(\text{CO})_2\text{Co}^+-\text{H}$	245 ± 12	1
$(\text{CH}_3\text{OD})\text{Co}^+-\text{H}$	147.6 ± 7.7	1
Co^+-H_2	76.1 ± 4.2	1
$(\eta^5-\text{C}_5\text{H}_5)\text{Co}^+-\text{H}_2$	67.8	1
Co^+-CH	420 ± 37	1
Co^+-CH_2	317 ± 5	1
Co^+-CH_3	203 ± 4	1
Co^+-CH_4	96.7	1
$\text{Co}^+-\text{C}_{60}$	243 ± 67	1
Co^+-CO	173.7 ± 6.7	1
$\text{Co}^+-\text{H}_2\text{O}$	164.4 ± 5.9	1
Co^+-CS	259 ± 33	1
Co^+-N_2	96.2 ± 7.1	1
Co^+-NH_2	247 ± 7	1
Co^+-NH_3	219 ± 16	1
$\text{Co}^+-\text{CH}_3\text{CN}$	$>255 \pm 17$	1
$\text{Co}^+-\text{P}(\text{CH}_3)_3$	278 ± 11	1
$\text{Co}^+-\text{P}(\text{C}_2\text{H}_5)_3$	339 ± 16	1
$(\text{CH})\text{Rh}^+-\text{H}$	372 ± 21	1
$(\eta^5-\text{C}_5\text{H}_5)(\text{CO})_2\text{Rh}^+-\text{H}$	287 ± 12	1
Rh^+-CH	444 ± 12	1
Rh^+-CH_2	356 ± 8	1
Rh^+-CH_3	142 ± 6	1
Rh^+-NO	167 ± 21	1
Rh^+-CS	234 ± 19	1
$(\text{CO})(\eta^5-\text{C}_5\text{H}_5)(\text{PPh}_3)\text{Ir}^+-\text{H}$	313.4	1
$(\text{CO})_2(\eta^5-\text{C}_5\text{Me}_5)\text{Ir}^+-\text{H}$	298.3	1
Ir^+-CH	666.7 ± 22.2	3
Ir^+-CH_2	474.7 ± 2.9	3
Ir^+-CH_3	313.6 ± 17.4	3
$\text{Ir}^+-\text{C}_2\text{H}_4$	234.3	1
(10) Group 10		
$(\text{CO})_4\text{Ni}^+-\text{H}$	248 ± 9	1
$(\eta^5-\text{C}_5\text{H}_5)(\text{NO})\text{Ni}^+-\text{H}$	315 ± 14	1
$(\eta^5-\text{C}_5\text{H}_5)(\eta^5-\text{C}_5\text{H}_5)\text{Ni}^+-\text{H}$	215 ± 13	1

Bond	$Do_{98}^2/\text{kJ mol}^{-1}$	Ref.	Bond	$Do_{98}^2/\text{kJ mol}^{-1}$	Ref.
Ni ⁺ -H ₂	72.4 ± 1.3	1	Ag ⁺ -O ₂	29.7 ± 0.8	1
Ni ⁺ -CH	301.0 ± 11.6	1	Ag ⁺ -CO	89 ± 5	1
Ni ⁺ -CH ₂	306 ± 4	1	Ag ⁺ -H ₂ O	134 ± 8	1
Ni ⁺ -CH ₃	169.8 ± 6.8	1	Ag ⁺ -CS	152 ± 20	1
Ni ⁺ -CH ₄	96.5 ± 4	1	Ag ⁺ -NH ₃	170 ± 13	1
Ni ⁺ -OH	235 ± 19	1	Au ⁺ -CH ₂	357.0 ± 6.8	5
Ni ⁺ -CO	175 ± 11	1	Au ⁺ -CH ₃	209.4 ± 23.2	5
Ni ⁺ -CO ₂	104 ± 1	1	Au ⁺ -C ₂ H ₄	344.5	1
Ni ⁺ -H ₂ O	183.7 ± 3.3	1	Au ⁺ -C ₆ H ₆	289 ± 29	1
Ni ⁺ -CS	234.5 ± 9.6	1	Au ⁺ -CO	201 ± 8	1
Ni ⁺ -N ₂	110.9 ± 10.5	1	Au ⁺ -H ₂ O	164.0 ± 9.6	1
Ni ⁺ -NO	227.6 ± 7.5	1	Au ⁺ -H ₂ S	230 ± 25	1
Ni ⁺ -NH ₂	232.5 ± 7.7	1	Au ⁺ -NH ₃	297 ± 29	1
Ni ⁺ -NH ₃	238 ± 19	1	Au ⁺ -PH ₃	402 ± 33	1
Pd ⁺ -CH	536 ± 10	1	(12) Group 12		
Pd ⁺ -CH ₂	463 ± 3	1	Zn ⁺ -H ₂	15.7 ± 1.7	1
Pd ⁺ -CH ₃	258 ± 8	1	Zn ⁺ -CH ₃	280 ± 7	1
Pd ⁺ -CH ₄	170.8 ± 7.7	1	Zn ⁺ -OH	127.2	1
Pd ⁺ -CS	200 ± 14	1	Zn ⁺ -H ₂ O	163	1
Pd ⁺ -C ₂ H ₂	>28.9 ± 4.8	1	Zn ⁺ -NO	76.2 ± 9.6	1
Pt ⁺ -H ₂	146.7 ± 11.6	1	Zn ⁺ -pyrimidine	209.6 ± 7.7	1
Pt ⁺ -CH	536.4 ± 9.6	1	Zn ⁺ -CS	149 ± 23	1
Pt ⁺ -CH ₂	471	1	Cd ⁺ -CH ₃	228 ± 3	1
Pt ⁺ -CH ₃	257.6 ± 7.7	1	Cd ⁺ (CH ₃)-CH ₃	109 ± 3	1
Pt ⁺ -CH ₄	170.8 ± 7.7	1	Cd ⁺ -C ₆ H ₆	136 ± 19	1
Pt ⁺ -O ₂	64.6 ± 4.8	1	Hg ⁺ -CH ₃	285 ± 3	1
Pt ⁺ -CO	218.1 ± 8.7	1	Hg ⁺ (CH ₃)-CH ₃	96 ± 3	1
Pt ⁺ -CO ₂	59.8 ± 4.8	1	(13) Group 13		
Pt ⁺ -NH ₃	274 ± 12	1	B ⁺ -H ₂	15.9 ± 0.8	1
Pt ⁺ -C ₂ H ₄	229.7	1	HB ⁺ -H ₂	61.5 ± 2.1	1
(11) Group 11			(CH ₃) ₂ B ⁺ -CH ₃	32.6 ± 4.2	1
Cu ⁺ -H ₂	51.9 ± 0.4	1	Al ⁺ -H ₂	5.6 ± 0.6	1
Cu ⁺ -CH ₂	267.3 ± 6.8	1	Al ⁺ -N ₂	5.6	1
Cu ⁺ -CH ₃	111 ± 7	1	Al ⁺ -CO ₂	≥29.3	1
Cu ⁺ -C ₂ H ₂	>21.2 ± 9.6	1	Al ⁺ -H ₂ O	104 ± 15	1
Cu ⁺ -C ₂ H ₄	176 ± 14	1	Al ⁺ -MeOH	139.7	1
Cu ⁺ -C ₆ H ₆	218.0 ± 9.6	1	Al ⁺ -EtC(O)Et	191.2	1
Cu ⁺ -CO	149 ± 7	1	Al ⁺ -C ₆ H ₆	147.3 ± 8.4	1
Cu ⁺ -N ₂	89 ± 30	1	Al ⁺ -pyridine	190.3 ± 10.3	1
Cu ⁺ -NO	109.0 ± 4.8	1	Al ⁺ -phenol	154.8 ± 16.7	1
Cu ⁺ -H ₂ O	160.7 ± 7.5	1	Al ⁺ -imidazole	232.4 ± 8.2	1
Cu ⁺ -NH ₂	192 ± 13	1	Ga ⁺ -NH ₃	122.5	1
Cu ⁺ -NH ₃	237 ± 15	1	In ⁺ -NH ₃	111.0	1
Cu ⁺ -CS	238.3 ± 11.6	1	(14) Group 14		
Cu ⁺ -SiH	246 ± 27	1	C ₅₈ ⁺ -C ₂	955 ± 15	1
Cu ⁺ -SiH ₂	≥231 ± 7	1	C ₆₀ ⁺ -C ₂	822.0 ± 12.5	1
Cu ⁺ -SiH ₃	97 ± 25	1	C ₆₂ ⁺ -C ₂	846.2 ± 10.6	1
Ag ⁺ -CH ₂	≥107 ± 4	1	C ₇₈ ⁺ -C ₂	938.8 ± 10.6	1
Ag ⁺ -CH ₃	66.6 ± 4.8	1	HC ₂ ⁺ -H	574.749	1
Ag ⁺ -C ₂ H ₅	65.7 ± 7.5	1	C ₆ H ₅ ⁺ -H	376.3 ± 4.8	1
Ag ⁺ -C ₆ H ₆	167 ± 19	1			

Bond	$Do_{98}^2/\text{kJ mol}^{-1}$	Ref.	Bond	$Do_{98}^2/\text{kJ mol}^{-1}$	Ref.
$\text{ON}^+-\text{H}_2\text{O}$	95	1	$(\text{H}_3\text{O})^+-\text{CO}_2$	64.0	1
$\text{ON}^+(\text{H}_2\text{O})-\text{H}_2\text{O}$	67.4	1	$(\text{H}_3\text{O})^+(\text{CO}_2)-\text{CO}_2$	51.9	1
$\text{ON}^+(\text{H}_2\text{O})_2-\text{H}_2\text{O}$	56.5	1	$(\text{H}_3\text{O})^+(\text{CO}_2)_2-\text{CO}_2$	43.9	1
$\text{H}_4\text{N}^+-\text{H}_2\text{O}$	86.2 ± 4.2	1	$(\text{H}_3\text{O})^+(\text{CO}_2)_3-\text{CO}_2$	18.0	1
$\text{H}_4\text{N}^+(\text{H}_2\text{O})-\text{H}_2\text{O}$	72.8 ± 4.2	1	O_2^+-ON_2	56.1 ± 4	1
$\text{H}_4\text{N}^+(\text{H}_2\text{O})_2-\text{H}_2\text{O}$	57.3 ± 4.2	1	$(\text{H}_3\text{O})^+-\text{ON}_2$	70.7 ± 6.5	1
$\text{H}_4\text{N}^+(\text{H}_2\text{O})_3-\text{H}_2\text{O}$	51.0	1	$(\text{H}_3\text{O})^+(\text{H}_2\text{O})-\text{ON}_2$	50.6 ± 2.1	1
$\text{H}_4\text{N}^+(\text{H}_2\text{O})_4-\text{H}_2\text{O}$	44.4	1	$(\text{H}_3\text{O})^+(\text{H}_2\text{O})_2-\text{ON}_2$	42.7 ± 2.1	1
$(\text{glycine})\text{H}^+-\text{H}_2\text{O}$	77.2 ± 11.0	1	O_3^+-O_3	67.5 ± 39	1
$(\text{tryptophan})\text{H}^+-\text{H}_2\text{O}$	31.2 ± 2.5	1	$\text{OCIO}^+-\text{OCIO}$	246 ± 48	1
$(\text{tryptophanylglycine})\text{H}^+-\text{H}_2\text{O}$	56.0 ± 5.3	1	$\text{O}_2^+-\text{H}_2\text{O}$	>67	1
$\text{H}_4\text{N}^+-\text{H}_2\text{S}$	47.7	1	$(\text{OH})^+(\text{H}_2\text{O})_2-\text{H}_2\text{O}$	87.4	1
$\text{H}^+(\text{NH}_3)-\text{NH}_3$	108.8	1	$(\text{OH})^+(\text{H}_2\text{SO}_4)(\text{H}_2\text{O})_4-\text{H}_2\text{O}$	56.9	1
$\text{H}^+(\text{NH}_3)_2-\text{NH}_3$	69.5	1	$(\text{OH})^+(\text{H}_2\text{SO}_4)(\text{H}_2\text{O})_5-\text{H}_2\text{O}$	49.8	1
$\text{H}^+(\text{NH}_3)_3-\text{NH}_3$	57.3	1	$(\text{OH})^+(\text{H}_2\text{SO}_4)(\text{H}_2\text{O})_6-\text{H}_2\text{O}$	44.8	1
$\text{H}^+(\text{NH}_3)_4-\text{NH}_3$	49.0	1	$(\text{H}_2\text{O})^+-\text{H}_2\text{O}$	164.0	1
$\text{H}^+(\text{NH}_3)_5-\text{NH}_3$	29.3	1	$(\text{H}_3\text{O})^+-\text{H}_2\text{O}$	140.2	1
$\text{H}^+(\text{NH}_3)_6-\text{NH}_3$	27.2	1	$(\text{H}_3\text{O})^+(\text{H}_2\text{O})-\text{H}_2\text{O}$	93.3	1
$\text{NH}_4^+-\text{CH}_4$	15.0	1	$(\text{H}_3\text{O})^+(\text{H}_2\text{O})_2-\text{H}_2\text{O}$	71.1	1
$\text{ON}^+-\text{CH}_3\text{OH}$	97.6	1	$(\text{H}_3\text{O})^+(\text{H}_2\text{O})_3-\text{H}_2\text{O}$	64.0	1
$\text{O}_2\text{N}^+-\text{CH}_3\text{OH}$	80.3 ± 9.6	1	$(\text{H}_3\text{O})^+(\text{H}_2\text{O})_4-\text{H}_2\text{O}$	54.4	1
$(\text{CH}_3\text{CNH})^+-\text{CH}_3\text{CN}$	130.1 ± 9.6	1	$(\text{H}_3\text{O})^+(\text{H}_2\text{O})_5-\text{H}_2\text{O}$	49.0	1
$(\text{pyridineH})^+-\text{pyridine}$	105.4 ± 4	1	$(\text{H}_3\text{O})^+(\text{H}_2\text{O})_6-\text{H}_2\text{O}$	43.1	1
$(\text{valine H})^+-\text{valine}$	86.6 ± 8.4	1	$(\text{HCOOH})\text{H}^+-\text{H}_2\text{O}$	100.8	1
$(\text{betainH})^+-\text{betaine}$	139.9 ± 4.8	1	$\text{CH}_3\text{OH}_2^+-\text{H}_2\text{O}$	115.6	1
$\text{H}_4\text{P}^+-\text{H}_2\text{O}$	54.4	1	$\text{CH}_3\text{CHOH}^+-\text{H}_2\text{O}$	104.6	1
$(\text{H}_4\text{P})^+-\text{PH}_3$	48.1	1	$(\text{CH}_3)_2\text{OH}^+-\text{H}_2\text{O}$	100.4	1
AsH_2^+-H	257	1	$(\text{tetrahydrofuranH})^+-\text{H}_2\text{O}$	82.8	1
$\text{I}_2\text{As}^+-\text{acetone}$	106 ± 17	1	$(\text{furanH})^+-\text{H}_2\text{O}$	43.5	1
$\text{I}_2\text{As}^+-\text{benzene}$	77 ± 17	1	$\text{furan}^+-\text{H}_2\text{O}$	41.0	1
$\text{Bi}^+-\text{H}_2\text{O}$	95.4	1	$(\text{phenol})^+-\text{H}_2\text{O}$	78.0	1
Bi^+-NH_3	149	1	$(1\text{-naphthol})^+-\text{H}_2\text{O}$	66.4	1
$\text{Bi}^+-\text{C}_6\text{H}_6$	≤ 149	1	$\text{H}_3\text{O}^+-\text{HC(O)H}$	137.7	1
(16) Group 16			$\text{H}_3\text{O}^+-\text{NH}_3$	229.3	1
$(\text{H}_3\text{O})^+-\text{H}_2$	14.6 ± 2.1	1	$\text{H}_3\text{O}^+(\text{NH}_3)-\text{NH}_3$	77.0	1
O^+-O_2	179.5	1	$\text{H}_3\text{O}^+(\text{NH}_3)_2-\text{NH}_3$	71.5	1
$\text{O}^+(\text{O}_2)_1-\text{O}_2$	28.9	1	$\text{H}_3\text{O}^+(\text{NH}_3)_3-\text{NH}_3$	62.8	1
$\text{O}^+(\text{O}_2)_2-\text{O}_2$	3.9	1	$\text{H}_3\text{O}^+-\text{PH}_3$	144	1
O_2^+-O_2	38.3 ± 2.1	1	$\text{H}_3\text{O}^+-\text{SO}_3$	74	1
$\text{O}_2^+(\text{O}_2)-\text{O}_2$	24.6 ± 1.3	1	$(\text{HCOOH})^+-\text{HCOOH}$	96.5 ± 9.6	1
$\text{O}_2^+(\text{O}_2)_2-\text{O}_2$	10.4 ± 0.8	1	$\text{H}_3\text{O}^+-\text{CH}_4$	33.5	1
$\text{O}_2^+(\text{O}_2)_3-\text{O}_2$	9.0 ± 0.8	1	$(\text{CH}_3\text{OH})^+-\text{CH}_3\text{OH}$	115.8 ± 19.3	1
$\text{O}_2^+(\text{O}_2)_4-\text{O}_2$	8.0 ± 0.8	1	$\text{CH}_3\text{OH}_2^+-\text{CH}_3\text{OH}$	136.4	1
$\text{O}_2^+(\text{O}_2)_5-\text{O}_2$	7.9 ± 1.3	1	$\text{H}_3\text{O}^+-\text{CH}_3\text{CN}$	195.4	1
O^+-N_2	231.4	1	$\text{furan}^+-\text{furan}$	94.1	1
O_2^+-N_2	22.6	1	BH^+-B , B = tetrahydrofuran	125.1	1
$(\text{H}_3\text{O})^+-\text{N}_2$	22.2 ± 2.1	1	S^+-CS_2	166	1
O_4^+-N_2	12.3	1	CS^+-CS_2	150.6	1
O_2^+-CO	31.8	1	$\text{CS}_2^+-\text{CS}_2$	104.2	1
O_2^+-CO_2	41.0 ± 2.1	1	$\text{HCS}_2^+-\text{CS}_2$	46.4	1
$\text{CO}_2^+-\text{CO}_2$	65.3 ± 4	1	OS^+-SO_2	57.7	1

Bond	$Do_{98}^2/\text{kJ mol}^{-1}$	Ref.	Bond	$Do_{98}^2/\text{kJ mol}^{-1}$	Ref.
$\text{O}_2\text{S}^+-\text{SO}_2$	63.6	1	$\text{He}^+(\text{He})_2-\text{He}$	2.7 ± 0.6	1
OCS^+-OCS	100.0	1	$\text{Ne}^+(\text{Ne})-\text{Ne}$	10.3 ± 0.6	1
OCS^+-CO_2	72.0	1	$\text{Ne}^+(\text{Ne})_2-\text{Ne}$	3.3 ± 0.6	1
$\text{SO}_2^+-\text{CO}_2$	42.7	1	$\text{Ar}^+(\text{Ar})-\text{Ar}$	20.4 ± 0.6	1
$\text{H}_3\text{S}^+-\text{H}_2\text{O}$	91.6	1	$\text{Ar}^+(\text{Ar})_2-\text{Ar}$	7.0 ± 0.6	1
thiophene $\text{H}^+-\text{H}_2\text{O}$	42.7	1	$\text{Ar}^+(\text{N}_2)-\text{Ar}$	25.1	1
$\text{H}_3\text{S}^+-\text{H}_2\text{S}$	53.6 ± 6.3	1	$\text{Ar}^+(\text{N}_2)(\text{Ar})-\text{Ar}$	7.1	1
$\text{H}_3\text{S}^+-\text{CH}_4$	16.3	1	$\text{Ar}^+(\text{N}_2)(\text{Ar})_2-\text{Ar}$	7.1	1
$(\text{CH}_3)_2\text{Se}^+-\text{Se}(\text{CH}_3)_2$	$\sim 95 \pm 3$	1	$\text{Kr}^+(\text{Kr})-\text{Kr}$	23.3 ± 0.6	1
$(\text{CH}_3)_2\text{Te}^+-\text{Te}(\text{CH}_3)_2$	97 ± 2	1	$\text{Kr}^+(\text{Kr})_2-\text{Kr}$	9.0 ± 0.6	1
(17) Group 17			$\text{Xe}^+(\text{Xe})-\text{Xe}$	25.2 ± 0.6	1
HF^+-HF	≥ 138	1	$\text{Xe}^+(\text{Xe})_2-\text{Xe}$	11.0 ± 0.6	1
$(\text{H}_2\text{Cl})^+-\text{Cl}$	39.6	1	Ar^+-H_2	93.7	1
HCl^+-HCl	83.9	1	Ar^+-N_2	127.6	1
Cl^+-CCl_3	446.7 ± 9.6	1	$\text{Ar}^+(\text{N}_2)-\text{N}_2$	31.0	1
$\text{Cl}^+-\text{C}_2\text{H}_3$	685.0 ± 4.8	1	$\text{Ar}^+(\text{N}_2)_2-\text{N}_2$	10.9	1
HBr^+-HBr	96	1	Ar^+-CO	75 ± 17	1
I^+-CH_3	330.0	1	$\text{Ar}^+(\text{CO})-\text{CO}$	13	1
$\text{I}^+(\text{CH}_3\text{I})-\text{CH}_3$	51.1	1	Kr^+-CO	103.3 ± 7.5	1
$\text{I}^+(\text{CH}_3\text{I})_2-\text{CH}_3$	112.9	1	Kr^+-CO_2	79.1 ± 2.9	1
(18) Group 18					
$\text{He}^+(\text{He})_1-\text{He}$	17.6	1			

References

1. Luo, Y. R., *Comprehensive Handbook of Chemical Bond Energies*, CRC Press, Boca Raton, FL, 2007.
2. Parke, L. G., Hinton, C. S., and Armentrout, P. B., *Int. J. Mass Spectrom.* 254, 168, 2006.
3. Li, F.-X., Zhang, X.-G., and Armentrout, P. B., *Int. J. Mass Spectrom.* 255/256, 279, 2006.
4. Meloni, G., Zou, P., Klippenstein, S. J., Ahmed, M., Leone, S. R., Taatjes, C. A., and Osborn, D. L., *J. Am. Chem. Soc.* 128, 13559, 2006.
5. Li, F.-X., and Armentrout, P. B., *J. Chem. Phys.* 125, 133114/1, 2006.
6. Parke, L. G., Hinton, C. S., and Armentrout, P. B., *J. Phys. Chem. C* 111, 17773, 2007.
7. Shuman, N. S., Ochieng, M. A., Sztáray, B., and Baer, T., *J. Phys. Chem. A* 112, 5647, 2008.