BOND DISSOCIATION ENERGIES

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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 → R + X. The BDE, denoted by D^o(R–X), is usually derived by the thermochemical equation, D^o(R–X) = $\Delta_f H^o$(R) + $\Delta_f H^o$(X) – $\Delta_f H^o$(RX). The enthalpy of formation $\Delta_f H^o$ 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
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(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^o(A–B), are converted to D^o_{298} by the approximate equation:

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

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

A–B	D^o_{298}/kJ mol^{-1}	Ref.	A–B	D^o_{298}/kJ mol^{-1}	Ref.	A–B	D^o_{298}/kJ mol^{-1}	Ref.	A–B	D^o_{298}/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^o_{298}/kJ mol^{-1}	Ref.	A–B	D^o_{298}/kJ mol^{-1}	Ref.	A–B	D^o_{298}/kJ mol^{-1}	Ref.	A–B	D^o_{298}/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^o_{298}/kJ mol^{-1}	Ref.	A–B	D^o_{298}/kJ mol^{-1}	Ref.	A–B	D^o_{298}/kJ mol^{-1}	Ref.	A–B	D^o_{298}/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^o_{298}/kJ mol^{-1}	Ref.	A–B	D^o_{298}/kJ mol^{-1}	Ref.	A–B	D^o_{298}/kJ mol^{-1}	Ref.	A–B	D^o_{298}/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	≥517.6 ± 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 ± 9.6	1	Ho–Te	≤259 ± 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^o_{298}/kJ mol^{-1}	Ref.	A–B	D^o_{298}/kJ mol^{-1}	Ref.	A–B	D^o_{298}/kJ mol^{-1}	Ref.	A–B	D^o_{298}/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^o_{298}/kJ mol^{-1}	Ref.	A–B	D^o_{298}/kJ mol^{-1}	Ref.	A–B	D^o_{298}/kJ mol^{-1}	Ref.	A–B	D^o_{298}/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			

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TABLE 2. Enthalpy of Formation of Gaseous Atoms

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

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TABLE 3. Bond Dissociation Energies in Polyatomic Molecules

The D^o_{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^o_{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^o_{298} in Table 3 are derived from the equation

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

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^o_{298}/kJ mol^{-1}	Ref.
(1) C–H BDEs		
CH_3–**H**	439.3 ± 0.4	1
CH_3CH_2–**H**	420.5 ± 1.3	1
$CH_3CH_2CH_2$–**H**	422.2 ± 2.1	1
CH_3C**H**$_2CH_3$	410.5 ± 2.9	1
$CH_3CH_2CH_2CH_2$–**H**	421.3	1
CH_3C**H**$_2CH_2CH_3$	411.1 ± 2.2	1
$(CH_3)_2CHCH_2$–**H**	419.2 ± 4.2	1
$(CH_3)_3C$–**H**	400.4 ± 2.9	1
$(CH_3)_3CCH_2$–**H**	419.7 ± 4.2	1
$(CH_3CH_2)C$**H**$(CH_3)_2$	400.8	1
CH_3C**H**$_2(CH_2)_2CH_3$	415.1	1
$(C_3H_7)C$**H**$(CH_3)_2$	396.2 ± 8.4	1
$CH_3CH(CH_3)C$**H**$(CH_3)_2$	399.2 ± 13.0	1
CH_3C**H**$_2(CH_2)_3CH_3$	410	1
CH_3C**H**$_2(CH_2)_4CH_3$	410	1
HCC–**H**	557.81 ± 0.30	1
HCCCC–**H**	539 ± 12	1
$CHCCH_2$–**H**	384.1 ± 4.2	1
CH_3CCCH_2–**H**	379.5	1
$HCCC$**H**$_2CH_3$	373.0	1
CH_2=$CHCCCH_2$–**H**	363.3	1
CH_3CCC**H**$_2CH_3$	365.3 ± 9.6	1
$HCCC$**H**$_2CH_2CH_3$	349.8 ± 8.4	1
$HCCC$**H**$(CH_3)_2$	345.2 ± 8.4	1
CH_3CCC**H**$(CH_3)_2$	344.3 ± 11.3	1
HCCCCCC–**H**	~543 ± 13	1
H_2C=CH–**H**	464.2 ± 2.5	1
CH_2=C=CH–**H**	371.1 ± 12.6	1
CH_3CH=CH–**H**	464.8	1
CH_2=$CHCH_2$–**H**	369 ± 3	1
CH_2=CH-CH_2CH_2–**H**	410.5	1
CH_2=CHC**H**$_2CH_3$	350.6	1
CH_2=$C(CH_3)CH_2$-**H**	372.8	1
CH_2=CHCH=$CHCH_2$-**H**	347.3 ± 12.6	1
$(CH_2$=$CH)_2CH$–**H**	320.5 ± 4.2	1
CH_2=CHC**H**$_2CH_2CH_3$	348.8	1
CH_2=CHC**H**$(CH_3)_2$	332.6 ± 7.1	1
CH_2=$C(CH_3CH_2)CH_2$–**H**	356.1 ± 8.4	1
$(CH_2$=$CH)_2C(CH_3)$ –**H**	322.2	1
H-*cyclo*-C_3H_5	444.8 ± 1.0	1
H-CH_2-*cyclo*-C_3H_5	407.5 ± 6.7	1
H-*cyclo*-C_4H_7	409.2 ± 1.3	1
H-*cyclo*-C_5H_9	400.0 ± 4.2	1
H-*cyclo*-C_6H_{11}	416.3	1
H–C_6H_5	472.2 ± 2.2	1
H–$CH_2C_6H_5$	375.5 ± 5.0	1
H–$CH(CH_3)C_6H_5$	357.3 ± 6.3	1
H–$CH(C_6H_5)_2$	353.5 ± 2.1	1
H–$CH(C_6H_4$-p-$OH)_2$	375.8 ± 4.7	1
H–$C(CH_3)_2C_6H_5$	348.1 ± 4.2	1
H–$C(C_6H_5)_3$	338.9 ± 8.4	1
1-**H**-$C_{10}H_7$	469.4 ± 5.4	1
2-**H**-$C_{10}H_7$	468.2 ± 5.9	1
H–CF_3	445.2 ± 2.9	1
H–CHF_2	431.8 ± 4.2	1
H–CH_2F	423.8 ± 4.2	1
H–$CClF_2$	421.3 ± 8.4	1
H–CCl_2F	410.9 ± 8.4	1
H–$CBrF_2$	415.5 ± 12.6	1
H–CHClF	421.7 ± 10.0	1
H–CCl_3	392.5 ± 2.5	1
H–$CHCl_2$	400.6 ± 2.0	1
H–CH_2Cl	419.0 ± 2.3	1
H–CFClBr	413 ± 21	1

Bond	D^o_{298}/kJ mol^{-1}	Ref.
H–CHClBr	406.0 ± 2.4	1
H–CCl_2Br	387 ± 21	1
H–$CClBr_2$	371 ± 21	1
H–CBr_3	399.2 ± 8.4	1
H–$CHBr_2$	412.6 ± 2.7	3
H–CH_2Br	427.2 ± 2.4	1
H–CI_3	423 ± 29	1
H–CHI_2	431.0 ± 8.4	1
H–CH_2I	431.6 ± 2.8	1
CF_3CF_2–**H**	429.7 ± 2.1	1
CHF_2CF_2–**H**	431.0 ± 18.8	1
CH_2FCF_2–**H**	433.0 ± 14.6	1
CHF_2CFH–**H**	426.8 ± 14.6	1
CF_3CH_2–**H**	446.4 ± 4.5	1
CH_3CF_2–**H**	416.3 ± 4.2	1
CH_2FCHF–**H**	413.4 ± 12.6	1
CHF_2CH_2–**H**	433.0 ± 14.6	1
CH_2FCH_2–**H**	433.5 ± 8.4	1
CH_3CHF–**H**	410.9 ± 8.4	1
CF_3CHCl–**H**	425.9 ± 6.3	1
CF_3CClBr–**H**	404.2 ± 6.3	1
$CClF_2CHF$–**H**	412.1 ± 2.1	1
CCl_3CCl_2–**H**	397.5 ± 8.4	1
$CHCl_2CCl_2$–**H**	393.3 ± 8.4	1
CH_3CCl_2–**H**	397.9 ± 5.0	1
CH_3CHCl–**H**	406.6 ± 1.5	1
CH_2ClCH_2–**H**	423.1 ± 2.4	1
CH_3CBr_2–**H**	397.1 ± 5.0	1
CH_2BrCH_2–**H**	415.1 ± 8.4	1
CH_3CHBr–**H**	415.0 ± 2.7	3
CF_2=CF–**H**	464.4 ± 8.4	1
$CF_3CF_2CF_2$–**H**	432.2	1
CH_3CH_2CHCl–**H**	407.0 ± 3.5	1
CH_2=CH-CHF–**H**	370.7 ± 4.6	1
CH_2=CHCHCl–**H**	370.7 ± 4.6	1
CH_2=CHCHBr–**H**	374.0 ± 4.6	1
H–C_6F_5	487.4	1
H–CH_2OH	401.92 ± 0.63	1
CH_2CHOH	467 ± 11	1
CH_3CH_2OH	401.2 ± 4.2	1
CH_3CH_2OH	421.7 ± 8	1
$CH_3CH_2CH_2OH$	392	1
$CH_3CH_2CH_2OH$	394.6 ± 8.4	1
$CH_3CH_2CH_2OH$	406.3 ± 8.4	1
$(CH_3)_2CHOH$	383.7 ± 8.4	1
$(CH_3)_2CHOH$	394.6 ± 8.4	1
CH_2=$CHCH_2OH$	341.4 ± 7.5	1
$(CH_3)_3COH$	418.4 ± 8.4	1
$(CH_2$=$CH)_2CHOH$	288.7	1
Ph_2CHOH	326	1
$CH_3CH(OH)_2$	~385	1
$(CH_2OH)_2$	385.3	1
$HOCH_2(CH_2)_2(OH)CH$–**H**	399.2	1
CH_3OCH_3	402.1	1
CHF_2OCF_3	443.5 ± 4.2	1
CHF_2OCHF_2	435.1 ± 4.2	1
CH_3OCF_3	426.8 ± 4.2	1
$CH_3OCH_2CH_3$	389.1	1
$(CH_3)_3COC(CH_3)_3$	402.1	1
$CH_3CH_2OCH_2CH_3$	389.1	1
CH_3CH_2Ot-$C(CH_3)_3$	405.4	1
CH_3OPh	385.0	1
H-2-oxiran-2-yl	420.5 ± 6.5	1
H-tetrahydrofuran-2-yl	385.3 ± 6.7	1
HC(O)–**H**	368.40 ± 0.67	1
FC(O)–**H**	423.0	1
$CH_3C(O)$–**H**	374.0 ± 1.3	1
$CF_3C(O)$–**H**	390.4	1
$C_2H_5C(O)$–**H**	374.5	1
CH_2=CHC(O)–**H**	372.8	1
$C_3H_7C(O)$–**H**	371.2	1
iso-$C_3H_7C(O)$–**H**	364.5	1
$C_4H_9C(O)$–**H**	372.0	1
$(CH_3)_2CHCH_2C(O)$–**H**	362.5	1
$C_2H_5CH(CH_3)C(O)$–**H**	360.8	1
tert-BuC(O)–**H**	375.1	1
$Et_2CHC(O)$–**H**	367.2	1
$CH_3(CH_2)_8C(O)$–**H**	373.3	1
$C_6H_5C(O)$–**H**	371.1 ± 10.9	1
$PhCH_2C(O)$–**H**	362.0	1
$PhC(CH_3)_2C(O)$–**H**	362.9	1
H–CH=C=O	448.1	1
$CH_3C(O)H$	394.5 ± 9.2	1
$CH_3C(O)Cl$	≤423.4	1
$CH_3CH_2C(O)H$	383.7	1
CH_3COCH_3	401.2 ± 2.9	1
$CF_3C(O)CH_3$	465.6	1
$CH_3COCH_2CH_3$	403.8	1
$MeCOCH_2Me$	386.2 ± 7.1	1
$EtCOCH_2Me$	396.5 ± 2.8	1
$CH_3CH_2COC_6H_5$	402.8 ± 3.6	1
$MeCH_2COPh$	388.7	1
H–C(O)OH	404.2	1
$CH_3C(O)OH$	398.7 ± 12.1	1
$ClCH_2C(O)OH$	398.9	1
H–$C(O)OCH_3$	399.2 ± 8.4	1
$CH_3C(O)OCH_3$	406.3 ± 10.5	1
$CH_3C(O)OCH_3$	404.6	1
$CH_3C(O)OCH_2CH_3$	401.7	1
$CH_3C(O)OPh$	419.2 ± 5.4	1
$CH_3CH_2C(O)OEt$	400	1
$PhCH_2C(O)OEt$	370.7	1
$Me_2CHC(O)OEt$	387.4	1
$PhCHMe(C(O)OEt)$	358.2	1
H-furaylmethyl	361.9 ± 8.4	1
CH_3NH_2	392.9 ± 8.4	1
CH_3N=CH_2	407.9 ± 14.6	1
$CH_3CH_2NH_2$	377.0 ± 8.4	1
$C_2H_5CH_2NH_2$	380.7 ± 8.4	1
$C_3H_7CH_2NH_2$	393.3 ± 8.4	1
$C_4H_9CH_2NH_2$	387.7 ± 8.4	1
$HOCH_2CH_2NH_2$	379.5 ± 8.4	1
$(CH_3CH_2)_2NH$	370.7 ± 8.4	1
$(C_3H_7CH_2)_2NH$	379.9 ± 8.4	1
$(C_4H_9CH_2)_2NH$	384.5 ± 8.4	1
$(C_2H_5)_2NCH_2CH_3$	379.5 ± 1.7	1
$(C_2H_5CH_2)_3N$	376.6 ± 8.4	1
$((CH_3)_2CCH_2)_3N$	388.3 ± 8.4	1
$(Bu)_2NCH_2(nPr)$	381 ± 10.0	1
$((CH_3)_2CH)_3N$	387.0 ± 8.4	1
$(CH_3)_2CHNH_2$	372.0 ± 8.4	1
CH_3NHCH_3	364.0 ± 8.4	1
$(CH_3)_3N$	380.7 ± 8.4	1
tert-$BuN(CH_3)_2$	376.6 ± 8.4	1
$((HOCH_2CH_2)_2(CH_3))N$	364.4 ± 8.4	1
$(HOCH_2CH_2)_3N$	379.9 ± 8.4	1
$((HOCH_2)CH(CH_3))_3N$	379.9 ± 8.4	1
$PhCH_2NH_2$	368.2	1
$PhN(CH_2CH_3)_2$	383.3 ± 4.2	1
Ph_2NCH_3	379.5 ± 1.7	1
$PhN(CH_2Ph)_2$	357.3 ± 8.8	1
$N(CH_2Ph)_3$	372.8 ± 2.5	1
$PhN(CH_2CH$=$CH_2)_2$	339.3 ± 2.9	1
$N(CH_2CH$=$CH_2)_3$	345.6 ± 3.3	1
$H_2NNH(CH_3)$	410	1
$HNN(CH_3)_2$	410	1
$(CH_3)_2NC_6H_5$	383.7 ± 5.4	1
H–CN	528.5 ± 0.8	1
CH_3CN	405.8 ± 4.2	1
CH_3CH_2CN	393.3 ± 12.6	1
$PhCH_2CN$	344.3	1
$C_6F_5CH_2CN$	350.6	1
$CH_2(CN)_2$	366.5	1
$CH_2(CN)(NH_2)$	355.2	1
$(CH_3)_2CHCN$	384.5	1
CH_3NC	389.1 ± 12.6	1
H–HCNN	405.8 ± 8.4	1
H–CNN	331 ± 17	1
CH_3NO_2	415.4	1
$CH_3CH_2NO_2$	410.5	1
$C_2H_5CH_2NO_2$	410.5	1
Me_2CHNO_2	394.9	1
$C_6H_5C(NO_2)CHCH_3$	357.3	1

Bond	D^o_{298}/kJ mol^{-1}	Ref.
H–C(S)H	399.6 ± 5.0	1
C**H**$_3$SH	392.9 ± 8.4	1
CH$_3$SC**H**$_3$	392.0 ± 5.9	1
PhSC**H**$_3$	389.1	1
PhC**H**$_2$SPh	352.3	1
(PhS)$_2$C**H**Ph	341.0	1
PhSC**H**Ph$_2$	344.8	1
C**H**$_3$SOCH$_3$	393.3	1
C**H**$_3$SO$_2$CH$_3$	414.2	1
C**H**$_3$SO$_2$CF$_3$	431.0	1
C**H**$_3$SO$_2$Ph	414.2	1
PhC**H**$_2$SO$_2$Me	380.7	1
PhC**H**$_2$SO$_2$CF$_3$	372.4	1
PhC**H**$_2$SO$_2$tBu	376.6	1
Ph$_2$C**H**SO$_2$Ph	365.3	1
C**H**$_2$(SPh)$_2$	372.4	1
H–CH$_2$SiMe$_3$	418 ± 6.3	1
H–CH$_2$C(CH$_3$)$_2$SiMe$_3$	409 ± 5	1
H–CH$_2$SiMe$_2$Ph	410.1	1
H–CH((CH$_3$)$_3$Si)$_2$	397 ± 13	1
H–CH$_2$B(RO)$_2$	412.5	1
H–CH((CH$_3$)$_2$P)$_2$	385 ± 13	1
(2) C–C BDEs		
CH$_3$–CH$_3$	377.4 ± 0.8	1
CH$_3$–C$_2$H$_5$	370.3 ± 2.1	1
CH$_3$–C$_3$H$_7$	372.0 ± 2.9	1
CH$_3$–*iso*-C$_3$H$_7$	369.0 ± 3.8	1
CH$_3$–C$_4$H$_9$	371.5 ± 2.9	1
CH$_3$–*iso*-C$_4$H$_9$	370.3 ± 4.6	1
CH$_3$–*sec*-C$_4$H$_9$	368.2 ± 2.9	1
CH$_3$–*tert*-C$_4$H$_9$	363.6 ± 2.9	1
CH$_3$–C$_5$H$_{11}$	368.4 ± 6.3	1
CH$_3$–CH(C$_2$H$_5$)$_2$	365.7 ± 4.2	1
CH$_3$–C(CH$_3$)$_2$(CH$_2$CH$_3$)	360.9 ± 6.3	1
CH$_3$–C$_6$H$_{13}$	368.2 ± 6.3	1
C$_2$H$_5$–C$_2$H$_5$	363.2 ± 2.5	1
C$_3$H$_7$–C$_3$H$_7$	366.1 ± 3.3	1
***iso*-C$_3$H$_7$**–*iso*-C$_3$H$_7$	353.5 ± 4.6	1
C$_4$H$_9$–C$_4$H$_9$	364.0 ± 3.8	1
***iso*-C$_4$H$_9$**–*iso*-C$_4$H$_9$	362.3 ± 6.3	1
***sec*-C$_4$H$_9$**–*sec*-C$_4$H$_9$	348.5 ± 3.3	1
***tert*-C$_4$H$_9$**–*tert*-C$_4$H$_9$	322.6 ± 4.2	1
CH$_3$–*cyclo*-C$_5$H$_9$	358.2 ± 5.0	1
CH$_3$–*cyclo*-C$_6$H$_{11}$	377.0 ± 7.5	1
***cyclo*-C$_6$H$_{11}$**–*cyclo*-C$_6$H$_{11}$	369.0 ± 8.4	1
CH$_3$–CH$_2$C≡CH	320.5 ± 5.0	1
CH$_3$–CH$_2$C≡CCH$_3$	308.4 ± 6.3	1
CH$_3$–CH(CH$_3$)C≡CH	305.4 ± 8.4	1
CH$_3$–CH(CH$_3$)C≡CCH$_3$	320.9 ± 6.3	1
CH$_3$–C(CH$_3$)$_2$C≡CH	295.8 ± 6.3	1
CH$_3$–C(CH$_3$)$_2$C≡CCH$_3$	303.3 ± 6.3	1
CH$_3$–CHCH$_2$	426.3 ± 6.3	1
CH$_3$–CH=CCH$_2$	359.8 ± 5.9	1
CH$_3$–cyclopro-en-1-yl	340.6 ± 20.9	1
CH$_3$–CH$_2$CH=CH$_2$	317.6 ± 3.8	1
CH$_3$–CH$_2$C(CH$_3$)=CH$_2$	310.0 ± 4.2	1
CH$_3$–CH(CH$_3$)CH=CH$_2$	302.5 ± 6.3	1
CH$_3$–C(CH$_3$)$_2$CH=CH$_2$	282.4 ± 6.3	1
CH$_3$–*cyclo*-C$_5$H$_7$	299.2 ± 8.4	1
CH$_3$–C$_6$H$_5$	426.8 ± 4.2	1
HCC–C$_6$H$_5$	590.8 ± 5.9	1
C$_2$H$_3$–C$_6$H$_5$	482.0 ± 5.4	1
CH$_3$-CH$_2$C$_6$H$_5$	325.1 ± 4.2	1
CH$_3$–CH(CH$_3$)C$_6$H$_5$	318.8 ± 8.4	1
CH$_3$–C(CH$_3$)$_2$C$_6$H$_5$	303.3 ± 8.4	1
CH$_3$–CH$_2$CHCHPh	295.4	1
CH$_3$–CH(C$_6$H$_5$)$_2$	315.9 ± 6.3	1
CH$_3$–C(CH$_3$)(C$_6$H$_5$)$_2$	290.8 ± 8.4	1
C$_6$H$_5$–C$_6$H$_5$	478.6 ± 6.3	1
C$_6$H$_5$–CH$_2$C$_6$H$_5$	383.7 ± 8.4	1
C$_6$H$_5$CH$_2$–CH$_2$C$_6$H$_5$	272.8 ± 9.2	1
C$_6$H$_5$–CH(C$_6$H$_5$)$_2$	361.1 ± 8.4	1
C$_6$H$_5$–C(C$_6$H$_5$)$_3$	324.3 ± 12.6	1
Ph$_2$CH–CHPh$_2$	247.3 ± 8.4	1
PhCH$_2$–CPh$_3$	234.7 ± 14.6	1
R-R, π-dimer, R = phenalenyl	42	1
R-R, σ-dimer, R = phenalenyl	42.7	1
R-R, R = 9-phenylfluorenyl	63.6	1
CF$_3$–CF$_3$	413.0 ± 5.0	1
CF$_3$–CHF$_2$	399.6 ± 8.4	1
CF$_3$–CClF$_2$	373.6 ± 12.5	1
CF$_3$–CH$_2$F	397.5 ± 8.4	1
CF$_3$–CCl$_3$	332.2 ± 5.4	1
CF$_3$–CHBrCl	377.0 ± 10.5	1
CF$_3$–CH$_2$Br	399.6 ± 8.4	1
CF$_3$–CH$_2$I	408.4 ± 10.5	1
CF$_3$–CH$_3$	429.3 ± 5.0	1
CHF$_2$–CHF$_2$	382.4 ± 15.5	1
CClF$_2$–CClF$_2$	378.7 ± 12.6	1
CF$_2$Cl–CFCl$_2$	358.6 ± 12.6	1
CHF$_2$–CH$_2$F	394.1 ± 16.7	1
CH$_2$F–CH$_2$F	368.2 ± 8.4	1
CHF$_2$–CH$_3$	405.0 ± 8.4	1
CH$_2$F–CH$_3$	388.3 ± 8.4	1
CHClF–CH$_3$	399.6 ± 12.6	1
CF$_2$Br–CHClF	369.4	1
CF$_2$Br–CH$_3$	396.6 ± 15.1	1
CCl$_3$–CCl$_3$	285.8 ± 6.3	1
CCl$_3$–CClF$_2$	282.0 ± 12.6	1
CCl$_3$–CHCl$_2$	303.3 ± 6.3	1
CCl$_3$–CH$_2$Cl	323.8 ± 8.4	1
CCl$_3$–CH$_3$	362.3 ± 6.3	1
CHCl$_2$–CHCl$_2$	326.9 ± 4.1	1
CHCl$_2$–CH$_2$Cl	352.2 ± 5.9	1
CHCl$_2$–CH$_3$	361.3 ± 2.5	1
CHBrCl–CH$_3$	384.5	1
CHClBr–CHClBr	317.1 ± 12.6	1
CH$_2$Cl–CH$_2$Cl	360.7 ± 8.4	1
CH$_2$Cl–CH$_3$	375.7 ± 9.2	1
Br$_3$C–CH$_3$	356.9 ± 12.6	1
Br$_3$C–CBr$_3$	278.7 ± 16.7	1
CHBr$_2$–CH$_3$	372.8	1
CH$_2$Br–CH$_2$Cl	378.2	1
CH$_2$Br–CH$_2$Br	379.9 ± 8.4	1
CH$_2$I–CH$_2$I	387.0 ± 10.5	1
CH$_3$–CH$_2$Br	381.6 ± 8.4	1
CH$_3$–CH$_2$I	384.5 ± 8.4	1
CF$_3$–CF$_2$CF$_3$	424.3 ± 13.6	1
CF$_3$–CF=CF$_2$	420.5	1
CH$_3$–CH$_2$CH$_2$Cl	371.4 ± 2.8	1
CH$_3$–CHClCH$_3$	367.5 ± 2.0	1
CH$_2$Cl–CHClCH$_3$	356.5 ± 8.4	1
CH$_2$Cl–CH$_2$CClH$_2$	369.0 ± 8.4	1
CH$_3$–CCl$_2$CH$_3$	362.8 ± 8.4	1
CH$_2$Br–CHBrCH$_3$	369.4 ± 8.4	1
CH$_2$ClCH$_2$–CHClCH$_3$	364.4 ± 8.4	1
CH$_2$ClCH$_2$–CH$_2$CClH$_2$	369.0 ± 8.4	1
CH$_3$CHBr–CHBrCH$_3$	355.6 ± 8.4	1
CF$_3$–C$_6$H$_5$	463.2 ± 12.6	1
CCl$_3$–C$_6$H$_5$	388.7 ± 8.4	1
CH$_3$–C$_6$F$_5$	439.3	1
CF$_3$–C$_6$F$_5$	435.1	1
CF$_3$–CH$_2$C$_6$H$_5$	365.7 ± 12.6	1
C$_6$F$_5$–C$_6$F$_5$	488.3	1
CF$_3$–CHPh$_2$	352.3 ± 16.7	1
CF$_3$–CPh$_3$	290.8 ± 16.7	1
CF$_2$CF–CFCF$_2$	558.1 ± 12.6	1
CH$_2$FCH$_2$–CPh$_3$	274.9 ± 16.7	1
CHF$_2$CH$_2$–CPh$_3$	264.0 ± 16.7	1
CH$_3$–CH$_2$OH	364.8 ± 4.2	1
CF$_3$–CH$_2$OH	405.4 ± 6.3	1
C$_2$H$_5$–CH$_2$OH	356.9 ± 5.0	1
C$_3$H$_7$–CH$_2$OH	357.3 ± 3.3	1
***iso*-C$_3$H$_7$**–CH$_2$OH	354.8 ± 4.2	1
C$_4$H$_9$–CH$_2$OH	355.6 ± 4.2	1
***sec*-C$_4$H$_9$**–CH$_2$OH	352.7 ± 4.2	1
***iso*-C$_4$H$_9$**–CH$_2$OH	354.0 ± 5.4	1
C$_6$H$_5$–CH$_2$OH	413.4 ± 5.4	1
HOH$_2$C–CH$_2$OH	358.2 ± 6.3	1
NH$_2$CH$_2$–CH$_2$OH	335.6 ± 10.5	1
CH$_3$–CH$_2$OCH$_3$	363.2 ± 5.0	1

Bond	D^o_{298}/kJ mol^{-1}	Ref.
CH_3OCH_2–CH_2OCH_3	338.9 ± 10.5	1
CH_3–C(O)H	354.8 ± 1.7	1
CCl_3–C(O)H	309.2 ± 5.0	1
CH_3–C(O)F	417.6 ± 6.3	1
CH_3–C(O)Cl	367.8 ± 6.3	1
CCl_3–C(O)Cl	289.1 ± 6.3	1
$CHCl_2$–C(O)Cl	312.5 ± 8.4	1
$CClH_2$–C(O)Cl	340.2 ± 8.4	1
C_6H_5–C(O)H	408.4 ± 4.2	1
C_6H_5–C(O)Cl	417.6 ± 6.3	1
CH_3–C(O)CH_3	351.9 ± 2.1	1
C_2H_5–C(O)CH_3	347.3 ± 2.9	1
C_3H_7–C(O)CH_3	348.5 ± 2.9	1
***iso*-C_3H_7**–C(O)CH_3	340.2 ± 3.8	1
C_4H_7–C(O)CH_3	346.9 ± 5.4	1
***tert*-C_4H_9**–C(O)CH_3	329.3 ± 4.2	1
C_6H_5–C(O)CH_3	406.7 ± 4.6	1
$C_6H_5CH_2$–C(O)CH_3	299.7 ± 8.4	1
HC(O)–C(O)H	295.8 ± 6.3	1
ClC(O)–C(O)Cl	292.5 ± 8.4	1
CH_3C(O)–C(O)H	302.5 ± 8.4	1
CH_3C(O)–C(O)CH_3	307.1 ± 4.2	1
C_6H_5C(O)–C(O)C_6H_5	288.3 ± 16.7	1
CH_3–C(O)OH	384.9 ± 8.4	1
CF_3–C(O)OH	370.7 ± 8.4	1
CCl_3–C(O)OH	310.5 ± 12.6	1
$CClH_2$–C(O)OH	357.7 ± 8.4	1
CH_2Br–C(O)OH	358.2 ± 8.4	1
NH_2CH_2–C(O)OH	349.4 ± 8.4	1
CH_3NHCH_2–C(O)OH	300.4 ± 8.4	1
C_6H_5–C(O)OH	429.7 ± 8.4	1
C_6F_5–C(O)OH	470.0 ± 10.5	1
$HOCH_2$–C(O)OH	371.5 ± 5.4	1
HOC(O)–C(O)OH	334.7 ± 6.3	1
CH_3NHCH_2–C(O)OH	301.2 ± 16.7	1
$CH_3CH(NH_2)$–C(O)OH	331.4 ± 16.7	1
NH_2CH_2–CH_2C(O)OH	325.5 ± 16.7	1
CN–**CN**	571.9 ± 6.7	1
HC(O)–**CN**	455.2 ± 8.4	1
HC(S)–**CN**	530.1 ± 8.4	1
CF_3–**CN**	469.0 ± 4.2	1
CH_3–**CN**	521.7 ± 9.2	1
NCC–**CN**	462.3	1
C_2H_5–**CN**	506.7 ± 7.5	1
CH_3–CH_2CN	348.1 ± 12.6	1
C_6H_5–CH_2CN	386.6 ± 8.4	1
CH_3–CH(CH_3)CN	332.6 ± 8.4	1
CH_3–C(CH_3)$_2$CN	340.6 ± 16.7	1
CH_3–C(CH_3)(CN)C_6H_5	250.6	1
$(Ph)_2(CN)C$–C(CN)$(Ph)_2$	109.6	1
$(NO_2)_3C$–C$(NO_2)_3$	308.8	1
C_{58}–C_2	955.2 ± 14.5	1
(3) C–halogen BDEs		
F–CN	482.8	1
F–CF_3	546.8 ± 2.1	1
F–CHF_2	533.9 ± 5.9	1
F–CH_2F	496.2 ± 8.8	1
F–CF_2Cl	511.7	1
F–$CFCl_2$	482.0 ± 10.5	1
F–CHFCl	462.3 ± 10.0	1
F–CCl_3	439.3 ± 4	1
F–CH_2Cl	465.3 ± 9.6	1
F–CH_3	460.2 ± 8.4	1
F–C≡CH	521.3	1
F–C≡CF	519 ± 21	1
F–CF=CF_2	546.4 ± 12.6	1
F–CF_2CF_3	532.2 ± 6.3	1
F–CH_2CF_3	457.7	1
F–CF_2CH_3	522.2 ± 8.4	1
F–C_2H_3	517.6 ± 12.6	1
F–C_2H_5	467.4 ± 8.4	1
F–C_3H_7	474.9 ± 8.4	1
F–*iso*-C_3H_7	483.8 ± 8.4	1
F–*tert*-C_4H_9	495.8 ± 8.4	1
F–C_6H_5	525.5 ± 8.4	1
F–C_6F_5	485 ± 25	1
F–$CH_2C_6H_5$	412.8 ± 4.2	1
F–COH	497.9 ± 10.5	1
F–COF	510.3	1
F–COCl	484.5	1
F–C(O)CH_3	511.7 ± 12.6	1
Cl–CN	422.6 ± 8.4	1
Cl–CF_3	365.3 ± 3.8	1
Cl–CHF_2	364 ± 8	1
Cl–CH_2F	354.4 ± 11.7	1
Cl–CF_2Cl	333.9 ± 10.5	1
Cl–$CFCl_2$	320.9 ± 8.4	1
Cl–CHFCl	346.0 ± 13.4	1
Cl–CCl_3	296.6	1
Cl–$CHCl_2$	311.1 ± 2.0	1
Cl–CH_2Cl	338.0 ± 3.3	1
Cl–$CBrCl_2$	287 ± 10.5	1
Cl–CH_2Br	332.8 ± 4.6	1
Cl–CH_2I	328.2 ± 6.9	1
Cl–CH_3	350.2 ± 1.7	1
Cl–C≡CCl	443 ± 50	1
Cl–C≡CH	435.6 ± 8.4	1
Cl–CH_2CN	267.4	1
Cl–CCl=CCl_2	383.7	1
Cl–CH=CH_2	394.1 ± 3.1	2
Cl–CF=CF_2	434.7 ± 8.4	1
Cl–CF_2CF_3	346.0 ± 7.1	1
Cl–CF_2CF_2Cl	331.4 ± 20.9	1
Cl–CCl_2CF_3	307.9	1
Cl–CCl_2CCl_3	303.8	1
Cl–$CHClCCl_3$	330.5 ± 4.2	1
Cl–CCl_2CHCl_2	311.7	1
Cl–$CHClCH_3$	327.9 ± 1.8	1
Cl–CH_2CH_2Cl	345.1 ± 5.0	1
Cl–$CHBrCH_3$	331.8 ± 8.4	1
Cl–CH_2CH_3	352.3 ± 3.3	1
Cl–CH_2CH=CH_2	298.3 ± 5.0	1
Cl–C_3H_7	352.7 ± 4.2	1
Cl–$CH_2CH_2CH_2Cl$	348.9	1
Cl–*iso*-C_3H_7	354.0 ± 6.3	1
Cl–CH_2CHCH=CH_2	342.7	1
Cl–C_4H_9	350.6 ± 6.3	1
Cl–*sec*-C_4H_9	350.2 ± 6.3	1
Cl–*tert*-C_4H_9	351.9 ± 6.3	1
CH_2CHCH**Cl**(CH_3)	300.0 ± 6.3	1
Cl–C_5H_{11}	350.6 ± 6.3	1
Cl–C(CH_3)$_2$(C_2H_5)	352.7 ± 6.3	1
Cl–*cyclo*-C_6H_{11}	360.2 ± 6.5	1
Cl–C_6H_5	399.6 ± 6.3	1
Cl–C_6F_5	383.3 ± 8.4	1
Cl–$CH_2C_6H_5$	299.9 ± 4.3	1
Cl–C(O)Cl	318.8 ± 8.4	1
Cl–COF	376.6	1
Cl–C(O)CH_3	354.0 ± 8.4	1
Cl–C(O)CH_2CH_3	353.3 ± 6.3	1
Cl–C(O)C_6H_5	341.0 ± 8.4	1
Cl–CH_2C(O)C_6H_5	309	1
Cl–CH_2C(O)OH	310.9 ± 2.2	1
Cl–C(O)OC_6H_5	364	1
Cl–C$(NO_2)_3$	302.1	1
Br–CN	364.8 ± 4.2	1
Br–CF_3	296.2 ± 1.3	1
Br–CHF_2	288.7 ± 8.4	1
Br–CF_2Cl	269.9 ± 6.3	1
Br–CCl_3	231.4 ± 4.2	1
Br–CH_2Cl	277.3 ± 3.6	1
Br–CBr_3	242.3 ± 8.4	1
Br–$CHBr_2$	274.9 ± 13.0	1
Br–CH_2Br	276.1 ± 5.3	1
Br–CH_2I	274.5 ± 7.5	1
Br–CH_3	294.1 ± 2.1	1
Br–C≡CH	410.5	1
Br–CH=CH_2	338.3 ± 3.1	1
Br–CF_2CF_3	283.3 ± 6.3	1
Br–$CClBrCF_3$	251.0 ± 6.3	1
Br–CF_2CF_2Br	282.8 ± 6.7	1
Br–$CHClCF_3$	274.9 ± 6.3	1
Br–CF_2CH_3	287.0 ± 5.4	1

Bond	D^o_{298}/kJ mol^{-1}	Ref.
Br–CH_2CH_2Cl	292.5 ± 8.4	1
Br–$CHClCH_3$	272.0 ± 8.4	1
Br–C_2H_5	292.9 ± 4.2	1
Br–$CH_2CH{=}CH_2$	237.2 ± 5.0	1
Br–C_3H_7	298.3 ± 4.2	1
Br–*iso*-C_3H_7	299.2 ± 6.3	1
Br–$CH_2CH_2CH_2Br$	324.7	1
Br–$CF_2CF_2CF_3$	278.2 ± 10.5	1
CF_3CF**Br**CF_3	274.2 ± 4.6	1
Br–C_4H_9	296.6 ± 4.2	1
Br–*sec*-C_4H_9	300.0 ± 4.2	1
Br–*tert*-C_4H_9	292.9 ± 6.3	1
Br–C_6H_5	336.4 ± 6.3	1
Br–C_6F_5	~328	1
Br-$CH_2C_6H_5$	239.3 ± 6.3	1
Br–$CH_2C_6F_5$	225.1 ± 6.3	1
Br–1–$C_{10}H_7$	339.7	1
Br–2–$C_{10}H_7$	341.8	1
Br–anthracenyl	322.6	1
Br–$C(O)CH_3$	292.0 ± 8.4	1
Br–$C(O)C_6H_5$	276.6 ± 8.4	1
Br–$CH_2C(O)CH_3$	257.9 ± 10.5	1
Br–$CH_2C(O)C_6H_5$	271	1
Br–$CH_2C(O)OH$	257.4 ± 3.7	1
Br–$C(NO_2)_3$	218.4	1
I–CN	320.1	1
I–CF_3	227.2 ± 1.3	1
I–CCl_3	168 ± 42	1
I–CH_2Cl	221.8 ± 4.2	1
I–CH_2Br	219.2 ± 5.4	1
I–CH_2I	216.9 ± 7.9	1
I–CH_3	238.9 ± 2.1	1
I–CH_2CN	187.0 ± 6.3	1
I–CF_2CF_3	219.2 ± 2.1	1
I–CF_2CF_2I	217.6 ± 6.7	1
I–CH_2CF_3	235.6 ± 4.2	1
I–$CHFCClF_2$	202 ± 2	1
I–CF_2CH_3	217.6 ± 4.2	1
I-CFICH3	218.0 ± 4.2	1
CF_3CF**I**CF_3	215.1	1
I–$CH{=}CH_2$	259.0 ± 4.2	1
I–C_2H_5	233.5 ± 6.3	1
I–$CH_2CH{=}CH_2$	185.8 ± 6.3	1
I–C_3H_7	236.8 ± 4.2	1
I–*iso*-C_3H_7	234.7 ± 6.3	1
I–C_4F_9	205.8	1
I–*tert*-C_4H_9	227.2 ± 6.3	1
I–C_6H_5	272.0 ± 4.2	1
I–C_6F_5	<301.7	1
I–$CH_2C_6H_5$	187.8 ± 4.8	1
I–1-naphthyl	274.5 ± 10.5	1
I–2-naphthyl	272.0 ± 10.5	1
I–CH_2CN	187.0 ± 8.4	1
I–CH_2OCH_3	229.4 ± 8.4	1
I–CH_2SCH_3	216.8 ± 6.3	1
I–$C(O)CH_3$	223.0 ± 8.4	1
I–$C(O)C_6H_5$	212.1 ± 8.4	1
I–$CH_2C(O)OH$	197.5 ± 2.7	1
I–$C(NO_2)_3$	144.8	1
(4) O–X BDEs		
HO–**H**	497.10 ± 0.29	1
FO–**H**	425.1	1
ClO–**H**	393.7	1
BrO–**H**	405	1
IO–**H**	403.3	1
CH_3O–**H**	440.2 ± 3	1
CF_3O–**H**	497.1	1
HC≡CO–**H**	443.1	1
C_2H_5O–**H**	441.0 ± 5.9	1
CH_2=CHO–**H**	355.6	1
CF_3CH_2O–**H**	447.7 ± 10.5	1
C_3H_7O–**H**	≤433 ± 2	1
iso-C_3H_7O–**H**	442.3 ± 2.8	1
C_4H_9O–**H**	432.3	1
sec-C_4H_9O–**H**	441.4 ± 4.2	1
tert-C_4H_9O–**H**	444.9 ± 2.8	1
tert-$BuCH_2O$–**H**	436.1	1
$C_6H_5CH_2O$–**H**	442.7 ± 8.8	1
$CH_3C(OH)O$–**H**	446.9 ± 6.3	1
$(CH_3)_2C(OH)O$–**H**	450.6 ± 6.3	1
HC(O)O–**H**	468.6 ± 12.6	1
$CH_3C(O)O$–**H**	468.6 ± 12.6	1
$C_2H_5C(O)O$–**H**	472.8	1
iso-$C_3H_7C(O)O$–**H**	472.8	1
$C_6H_5C(O)O$–**H**	464.4 ± 16.7	1
HOO–**H**	366.06 ± 0.29	1
CH_3OO–**H**	370.3 ± 2.1	1
CF_3OO–**H**	383	1
CH_2FOO–**H**	379	1
CCl_3OO–**H**	386	1
$CHCl_2OO$–**H**	383	1
CH_2ClOO–**H**	379	1
CBr_3OO–**H**	383	1
CH_2BrOO–**H**	379	1
C_2H_5OO–**H**	354.8 ± 9.2	1
$CH_3CHClOO$–**H**	377	1
CH_3CCl_2OO–**H**	383	1
$CF_3CHClOO$–**H**	384	1
C_2Cl_5OO–**H**	383	1
iso-C_3H_7OO–**H**	356	1
CH_2=$CHCH_2OO$–**H**	372.4	1
tert-C_4H_9OO–**H**	352.3 ± 8.8	1
C_6H_5OO–**H**	384	1
$C_6H_5CH_2OO$–**H**	363	1
$(C_6H_5)_2CHOO$–**H**	370	1
$CH_3C(O)OO$–**H**	386	1
$CCl_2(CN)OO$–**H**	384	1
$OHCH_2OO$–**H**	368	1
H–ONO	330.7	1
H–OONO	299.2	1
H–ONH_2	318	1
H–ONO_2	426.8	1
H–ONNOH	189	1
H–OPO_2	465.7 ± 12.6	1
H–OSO_2OH	441.4 ± 14.6	1
H–OSiMe3	495	1
(CH_3)CHNO-**H**	354.4	1
$(CH_3)_2$CNO-**H**	354.0	1
(C_6H_5)CHNO-**H**	368.6	1
PhO–**H**	362.8 ± 2.9	1
α-tocopherol RO-**H**	323.4	1
β-tocopherol RO-**H**	335.6	1
γ-tocopherol RO-**H**	335.1	1
δ-tocopherol RO-**H**	342.8	1
p-$C_6H_5CH_2$-C_6H_4O-**H**	356.2	1
O–O_2	106.6	1
HO–OH	210.66 ± 0.42	1
HO–OF	199.7 ± 8.4	1
HO–OCl	~146	1
HO–OBr	138.5 ± 8.4	1
FO–OF	199.6	1
ClO–OCl	72.4 ± 2.8	1
IO–OI	74.9 ± 17	1
***trans-perp*-HO**–ONO	≤67.8 ± 0.4	1
***cis-cis*-HO**–ONO	83.3 ± 2.1	1
HO–ONO_2	163.2 ± 8.4	1
HO–OCH_3	189.1 ± 4.2	1
HO–OCF_3	201.3 ± 20.9	1
HO–OC_2H_5	178.7 ± 6.3	1
HO–O-*iso*-C_3H_7	185.8 ± 6.3	1
HO–O-*tert*-C_4H_9	186.2 ± 4.2	1
HO–$OC(O)CH_3$	169.9 ± 2.1	1
HO–$OC(O)C_2H_5$	169.9 ± 2.1	1
CH_3O–OCH_3	167.4 ± 6.3	1
CF_3O–OCF_3	198.7 ± 2.1	1
C_2H_5O–OC_2H_5	166.1	1
C_3H_7O–OC_3H_7	155.2 ± 4.2	1
***iso*-C_3H_7O**–O-*iso*-C_3H_7	157.7	1
***sec*-C_4H_9O**–O-*sec*-C_4H_9	152.3 ± 4.2	1
***tert*-BuO**–O-*tert*-Bu	162.8 ± 2.1	1
***tert*-$BuCH_2O$**–OCH_2-*tert*-Bu	152.3	1
$EtC(Me)_2O$–$OC(Me)_2Et$	164.4 ± 4.2	1
$(CF_3)_3CO$–$OC(CF_3)_3$	148.5 ± 4.6	1

Bond	D^o_{298}/kJ mol^{-1}	Ref.
Ph_3CO–$OCPh_3$	131.4	1
SF_5O–OSF_5	155.6	1
SF_5O–$OOSF_5$	126.8	1
$(CH_3)_3CO$–$OSi(CH_3)_3$	196.6	1
***tert*-BuO**–$OGeEt_3$	192.5	1
***tert*-BuO**–$OSnEt_3$	192.5	1
CF_3OO–OCF_3	126.8 ± 8.4	1
HC(O)O–**OH**	199.2 ± 8.4	1
FC(O)O–OC(O)F	96.2	1
$CH_3C(O)O$–ONO_2	131.4 ± 8.4	1
$CH_3C(O)O$–$OC(O)CH_3$	140.2 ± 21	1
$CF_3C(O)O$–$OC(O)CF_3$	125.5	1
$CF_3OC(O)O$–OC(O)F	121.3 ± 4.2	1
$CF_3OC(O)O$–OCF_3	142.3 ± 2.9	1
$CF_3OC(O)O$–OC(O)OCF_3	119.2	1
$C_2H_5C(O)O$–OC(O)C_2H_5	150.6	1
$C_3H_7C(O)O$–OC(O)C_3H_7	150.6	1
$FS(O)_2O$-$OS(O)_2F$	92–100	1
HO–CF_3	≤482.0 ± 1.3	1
FO–CF_3	408 ± 17	1
HO–CH_3	384.93 ± 0.71	1
HO–C_2H_5	391.2 ± 2.9	1
HO–CH_2CF_3	408.4 ± 8.4	1
HO–$CH_2CH{=}CH_2$	332.6 ± 4.2	1
HO–C_3H_7	392.0 ± 2.9	1
HO–*iso*-C_3H_7	397.9 ± 4.2	1
HO–C_4H_9	389.9 ± 4.2	1
HO–*sec*-C_4H_9	396.1 ± 4.2	1
HO–*iso*-C_4H_9	394.1 ± 4.2	1
HO–*tert*-C_4H_9	398.3 ± 4.2	1
HO–$CH(CH_3)(nC_3H_7)$	398.3 ± 4.2	1
HO–$CH(C_2H_5)_2$	399.2 ± 4.2	1
HO–$C(CH_3)_2(C_2H_5)$	395.8 ± 6.3	1
HO–C_6H_5	463.6 ± 4.2	1
HO–C_6F_5	446.9 ± 9.2	1
HO–$CH_2C_6H_5$	334.1 ± 2.6	1
HO–$C(CH_3)_2C_6H_5$	339.3 ± 6.3	1
cyclo-C_5H_9–**OH**	385.8 ± 6.3	1
1-$C_{10}H_7$–**OH**	468.6 ± 6.3	1
2-$C_{10}H_7$–**OH**	467.8 ± 6.3	1
$(CH_3)_2(NH_2)C$–**OH**	310.4 ± 6.3	1
$CH_3C(O)$-**OH**	459.4 ± 4.2	1
$HOCH_2$-**OH**	411.3	1
CH_3–OCH_3	351.9 ± 4.2	1
ICH_2–OCH_3	373.2 ± 12.6	1
CH_3O–**C_2H_5**	355.2 ± 5.4	1
CH_3O–**$CHClCH_3$**	370.3 ± 8.4	1
CH_3O–**C_3H_7**	358.6 ± 6.3	1
CH_3O–***iso*-C_3H_7**	360.7 ± 4.2	1

Bond	D^o_{298}/kJ mol^{-1}	Ref.
CH_3O-**C_4H_9**	346.0 ± 6.3	1
CH_3O-***tert*-C_4H_9**	353.1 ± 6.3	1
C_6H_5–OCH_3	418.8 ± 5.9	1
$C_6H_5CH(CH_3)$–OCH_3	313.4 ± 9.6	1
C_6H_5–OC_6H_5	326.8 ± 4.2	1
CH_3–OC(O)H	383.7 ± 12.6	1
HC(O)–OH	457.7 ± 2.1	1
$CH_3C(O)$–OH	459.4 ± 4.2	1
$C_6H_5C(O)$–OH	447.7 ± 10.5	1
HO–$CH_2C(O)OH$	368.2 ± 10.5	1
CH_3-$OC(O)CH_3$	380.3 ± 12.6	1
HC(O)–OCH_3	423.8 ± 4.2	1
$CH_3C(O)$–OCH_3	424.3 ± 6.3	1
$C_6H_5C(O)$–OCH_3	421.3 ± 12.6	1
$C_6H_5C(O)$–OC_6H_5	307.5 ± 8.4	1
CH_3OCH_2–OCH_3	367.5 ± 8.4	1
$CH_3C(O)$–$OC(O)CH_3$	382.4 ± 12.6	1
$C_6H_5C(O)$–$OC(O)C_6H_5$	384.9 ± 16.7	1
CH_3–OOH	300.4 ± 12.6	1
C_2H_5–OOH	332.2 ± 20.9	1
C_3H_7–OOH	364.4	1
***iso*-C_3H_7**–OOH	298.3	1
***tert*-C_4H_9**–OOH	309.2 ± 4.2	1
CH_3–$OOCH_3$	292.5 ± 8.4	1
CF_3–$OOCF_3$	361.5 ± 8.4	1
CH_3–**OO**	137.0 ± 3.8	1
CF_3–**OO**	169.0	1
$CClF_2$–**OO**	127.6	1
CCl_2F-**OO**	124.7	1
CH_2Cl–**OO**	122.4 ± 10.5	1
$CHCl_2$–**OO**	108.2 ± 8.2	1
CCl_3–**OO**	92.0 ± 6.4	1
HC(O)–**OOH**	290.0	1
$CH_3C(O)$–$OOC(O)CH_3$	315.1	1
ClO–CF_3	≤369.9 ± 1.3	1
CH_3–**ONO**	245.2	1
C_2H_5–**ONO**	260.2	1
C_3H_7–**ONO**	249.4 ± 6.3	1
iso-C_3H_7–**ONO**	254.4 ± 6.3	1
C_4H_9–**ONO**	256.5 ± 6.3	1
iso-C_4H_9–**ONO**	254.0 ± 6.3	1
sec-C_4H_9–**ONO**	253.6 ± 6.3	1
tert-C_4H_9–**ONO**	252.7 ± 6.3	1
$(C_2H_5)(CH_3)_2C$–**ONO**	254.0 ± 8.4	1
CH_3–**ONO_2**	340.2	1
C_2H_5–**ONO_2**	344.8	1
CH_3O–CH_2CN	393.3	1
O–**N_2**	167.4 ± 0.4	1
O–**NO**	306.21 ± 0.13	1
O–**NO_2**	206.3	1
NO–**NO**	40.6 ± 2.1	1

Bond	D^o_{298}/kJ mol^{-1}	Ref.
O_2N–**ONO_2**	95.4 ± 1.5	1
cis-HO–**NO**	207.0	1
trans-HO-**NO**	200.64 ± 0.19	1
FO–**NO**	132.5 ± 17	1
cis-ClO–**NO**	127.6 ± 8.4	1
trans-ClO–**NO**	116.6 ± 8.4	1
cis-BrO–**NO**	138.1 ± 8.4	1
trans-BrO–**NO**	121.6 ± 8.4	1
trans-perp-HOO–**NO**	114.2 ± 4	1
CH_3O–**NO**	176.6 ± 3.3	1
C_2H_5O–**NO**	185.4 ± 4.2	1
C_3H_7O–**NO**	179.1 ± 6.3	1
iso-C_3H_7O–**NO**	175.3 ± 4.2	1
C_4H_9O–**NO**	177.8 ± 6.5	1
iso-C_4H_9O–**NO**	175.7 ± 6.5	1
sec-C_4H_9O–**NO**	173.6 ± 3.3	1
tert-C_4H_9O–**NO**	176.1 ± 5.9	1
tert-AmO–**NO**	171.1 ± 0.4	1
C_6H_5O–**NO**	87.0	1
HO–**NO_2**	205.4	1
FO–**NO_2**	131.8 ± 12.6	1
ClO–**NO_2**	110.9	4
BrO–**NO_2**	118.0 ± 6.3	1
IO–**NO_2**	~100	1
CH_3O–**NO_2**	176.1 ± 4.2	1
C_2H_5O–**NO_2**	174.5 ± 4.2	1
C_3H_7O–**NO_2**	177.0 ± 4.2	1
iso-C_3H_7O–**NO_2**	175.7 ± 4.2	1
HOO–**NO_2**	99.2 ± 4.6	1
CH_3OO–**NO_2**	86.6 ± 8.4	1
CF_3OO–**NO_2**	105	1
CF_2ClOO–**NO_2**	106.7	1
$CFCl_2OO$–**NO_2**	106.7	1
CCl_3OO–**NO_2**	95.8	1
$CH_3N(O)$-**O**	305.3 ± 4.4	1
$C_6H_5N(O)$-**O**	392 ± 8	1
C_5H_5N-**O**	264.9 ± 2.0	1
$C_6H_5N{=}N(O)(C_6H_5)$-**O**	309.4 ± 3.5	1
$C_6H_5(O)N{=}N(O)(C_6H_5)$-**O**	309.4 ± 3.6	1
O–SO	551.1	1
O–SOF_2	513.3	1
O–$SOCl_2$	398.5	1
O–$S(OH)_2$	493.7 ± 25	1
HO–SH	293.3 ± 16.7	1
HO–SOH	313.4 ± 12.6	1
HO–$S(OH)O_2$	384.9 ± 8.4	1
HO–SCH_3	303.8 ± 12.6	1
HO–SO_2CH_3	360.2 ± 12.6	1
F–OH	215.1	1
F–OF	164.1	1

Bond	D^o_{298}/kJ mol^{-1}	Ref.
F–OCF_3	200.8 ± 4.2	1
F–OCH_3	>196.6	1
F–ONO_2	143.1	1
Cl–OH	233.5	1
Cl–OCl	142	1
Cl–OCF_3	≤220.9 ± 8.4	1
Cl–OCH_3	200.8	1
Cl–O-*tert*-C_4H_9	198.3	1
Cl–OOCl	91.2	1
Cl–ONO_2	172.0	1
Br–OH	209.6 ± 4.2	1
Br–OBr	125	1
Br–O-*tert*-C_4H_9	183.3	1
Br–ONO_2	143.1 ± 6.3	1
I–OH	213.4	1
I–OI	130.1	1
I-ONO_2	>140.6	1
(5) N–X BDEs		
H–NH_2	450.08 ± 0.24	1
H–NF_2	316.7 ± 10.5	1
H–NNH	254.4	1
H–N_3	≤389	1
H–N=CH_2	364 ± 25	1
H–NO	199.5	1
H–NHOH	341	1
H–NCO	460.7 ± 2.1	1
H–NCS	≤396.6 ± 4.6	1
H–NCS	347.3 ± 8.4	1
CH_3N**H**$_2$	425.1 ± 8.4	1
tert-BuN**H**$_2$	397.5 ± 8.4	1
$C_6H_5CH_2N$**H**$_2$	418.4	1
$(CH_3)_2$**N**H	395.8 ± 8.4	1
H–NHNH(CH_3)	276 ± 21	1
H–NHN(CH_3)$_2$	356 ± 21	1
N**H**$_2$CN	414.2	1
(N**H**$_2$)$_2$C=O	464.4	1
(N**H**$_2$)$_2$C=S	389.1	1
CH_3CSN**H**$_2$	380.7	1
PhCSN**H**$_2$	380.7	1
(PhN**H**)$_2$C=S	364.0	1
(N**H**$_2$)$_2$C=NH	435.1	1
$Ph_2C=N$**H**	489.5	1
H–N($SiMe_3$)$_2$	464	1
H–NHPh	375.3	1
C_6H_5N**H**OH	292	1
C_6H_5N**H**(CONMe2)	387.9	1
H–NPh_2	364.8	1
HN–N_2	63	1
ON–N	480.7 ± 0.4	1
ON–NO	8.49 ± 0.12	1

Bond	D^o_{298}/kJ mol^{-1}	Ref.
ON–NO_2	42.5	1
O_2N–NO_2	57.3 ± 1	1
H_2N–NH_2	277.0 ± 1.3	1
F_2N–NF_2	92.9 ± 12.6	1
H_2N–$NHCH_3$	275.8 ± 8.4	1
H_2N–N(CH_3)$_2$	259.8 ± 8.4	1
H_2N–NHC_6H_5	227.6 ± 8.4	1
H_2N–NO_2	230	1
$H_2NN(CH_3)$–**NO**	179.6	1
$(C_6H_5)_2$N-**NO**	94.6	1
N_3–CH_3	335.1 ± 20.5	1
N_3–C_6H_5	375.7 ± 20.9	1
N_3–$CH_2C_6H_5$	211.3 ± 14.2	1
CH_3–**NC**	413.0 ± 3.3	1
C_2H_5–**NC**	413.4 ± 8.4	1
iso-C_3H_7–**NC**	423.0 ± 8.4	1
tert-C_4H_9–**NC**	399.6 ± 5.4	1
NC–**NO**	204.4	1
CH_3–**NO**	172	1
CF_3–**NO**	167	1
CCl_3–**NO**	125	1
C_2H_5–**NO**	171.5	1
CH_2CHCH_2–**NO**	110	1
iso-C_3H_7–**NO**	152.7 ± 12.6	1
tert-C_4H_9–**NO**	167	1
C_6H_5–**NO**	226.8 ± 2.1	1
C_6F_5–**NO**	211.3 ± 4.2	1
$C_6H_5CH_2$–**NO**	123	1
CH_3–**NO_2**	260.7 ± 2.1	1
C_2H_5–**NO_2**	254.4	1
C_3H_7–**NO_2**	256.5	1
iso-C_3H_7–**NO_2**	259.8	1
C_4H_9–**NO_2**	254.8	1
sec-C_4H_9–**NO_2**	263.2	1
tert-C_4H_9–**NO_2**	258.6	1
C_6H_5–**NO_2**	295.8 ± 4.2	1
$C_6H_5CH_2$–**NO_2**	210.3 ± 6.3	1
$(NO_2)CH_2$–**NO_2**	207.1	1
$(NO_2)_3C$–**NO_2**	176.1	1
CF_3–**NF_2**	280.7	1
$C_6H_5CH_2$–**NF_2**	237.2 ± 14.6	1
CH_3–**NH_2**	356.1 ± 2.1	1
C_2H_5–**NH_2**	352.3 ± 6.3	1
C_3H_7–**NH_2**	356.1 ± 2.9	1
iso-C_3H_7–**NH_2**	357.7 ± 3.8	1
C_4H_9–**NH_2**	356.1 ± 2.9	1
sec-C_4H_9–**NH_2**	359.0 ± 2.9	1
iso-C_4H_9–**NH_2**	254.8 ± 5.0	1
tert-C_4H_9–**NH_2**	355.6 ± 6.3	1
pyridin-2-yl–**NH_2**	431	1
C_6H_5–**NH_2**	429.3 ± 4.2	1

Bond	D^o_{298}/kJ mol^{-1}	Ref.
$C_6H_5CH_2$–**NH_2**	306.7 ± 6.3	1
$C_6H_5CH(CH)_3$–**NH_2**	307.5 ± 9.6	1
HC(O)–**NH_2**	421.7 ± 8.4	1
$CH_3C(O)$–**NH_2**	414.6 ± 8.4	1
HS–**NO**	138.9	1
CH_3S–**NO**	104.6 ± 4.2	1
tert-BuS–**NO**	115.1	1
$PhCH_2S$–**NO**	120.5	1
C_6H_5S-**NO**	81.2 ± 5.4	1
SCN–SCN	255.6	1
FSO_2–NF_2	163	1
F–NO	235.26	1
F–NO_2	221.3	1
F–NF_2	254.0	1
F–NH_2	286.6	1
Cl–NO	158.8 ± 0.8	1
Cl–NO_2	141.8 ± 1.3	1
Cl–NF_2	~134	1
Cl–NH_2	253.1	1
Br–NO	120.1 ± 0.8	1
Br–NO_2	82.0 ± 7.1	1
Br–NF_2	<227.2	1
I–NO	75.6 ± 4	1
I–NO_2	79.6 ± 4	1
(6) S–X BDEs		
H–SH	381.18 ± 0.05	1
H–SCH_3	365.7 ± 2.1	1
H–$SCHCH_2$	351.5 ± 8.4	1
H–SC_2H_5	365.3	1
H–SC_3H_7	365.7	1
H–S-*iso*-C_3H_7	369.9 ± 8.4	1
H–S-*tert*-C_4H_9	362.3 ± 9.2	1
H–SOH	330.5 ± 14.6	1
H–$SCOCH_3$	370.7	1
H–SCOPh	364	1
H–SO_2CH_3	≤397	1
H–$SSCH_3$	330.5 ± 14.6	1
H–SPh	349.4 ± 4.5	1
H–SSH	318.0 ± 14.6	1
H–SSSH	292.9 ± 6.5	1
HS–SH	270.7 ± 8.4	1
FS–SF	362.3	1
ClS–SCl	329.7	1
HS–SCH_3	272.0	1
HS–SPh	255.2 ± 6.3	1
CH_3S–SCH_3	272.8 ± 3.8	1
C_2H_5S–SC_2H_5	276.6	1
MeS–SPh	272.0 ± 6.3	1
C_6H_5S–SC_6H_5	214.2 ± 12.6	1
F_5S–SF_5	305 ± 21	1

Bond	D^o_{298}/kJ mol^{-1}	Ref.
HS–CH_3	312.5 ± 4.2	1
HS–C_2H_5	307.9 ± 2.1	1
HS–C_3H_7	310.5 ± 2.9	1
HS–*iso*-C_3H_7	307.1 ± 3.8	1
HS–C_4H_9	309.2 ± 2.9	1
HS–*sec*-C_4H_9	307.5 ± 2.9	1
HS–*iso*-C_4H_9	310.0 ± 4.6	1
HS–*tert*-C_4H_9	301.2 ± 3.8	1
HS–C_6H_5	360.7 ± 6.3	1
HS–$CH_2C_6H_5$	258.2 ± 6.3	1
HS–C(O)H	309.6 ± 8.4	1
HS–C(O)CH_3	307.9 ± 6.3	1
CH_3S–**CH_3**	307.9 ± 3.3	1
HOS–**CH_3**	284.9 ± 12.6	1
CH_3SO–**CH_3**	221.8 ± 8.4	1
$HOSO_2$–**CH_3**	324.3 ± 12.6	1
CH_3SO_2–**CH_3**	279.5	1
F_5S–CF_3	392 ± 43	1
F–SF_5	391.6	1
F–SO_2(F)	379	1
Cl–SF_5	<272	1
Cl–SO_2CH_3	293	1
Cl-SO_2Ph	297	1
Br-SBr	259 ± 17	1
Br–SF_5	<230	1
I-SH	206.7 ± 8.4	1
I-SCH_3	206.3 ± 7.1	1
(7) Si-, Ge-, Sn-, and Pb–X BDEs		
SiH_3–**H**	383.7 ± 2.1	1
Me_3Si–**H**	396 ± 7	1
H_5Si_2–**H**	373 ± 8	1
$(C_2H_5)_3Si$–**H**	396 ± 4	1
$C_6H_5SiH_2$–**H**	382 ± 5	1
$(CH_3S)_3Si$–**H**	364.0	1
$(iPrS)_3Si$–**H**	376.6	1
$PhMe_2Si$–**H**	377 ± 7	1
Ph_2SiH–**H**	379 ± 7	1
Ph_2MeSi–**H**	361 ± 10	1
SiF_3–**H**	432 ± 5	1
$SiCl_3$–**H**	391	5
$SiBr_3$–**H**	334 ± 8	1
SiH_3–**SiH_3**	321 ± 4	1
SiH_3–Si_2H_5	313 ± 8	1
Ph_3Si–$SiPh_3$	368.2	1
F_3Si–SiF_3	453.1 ± 25	1
SiH_3–**CH_3**	375 ± 5	1
SiF_3–**CH_3**	355.6	1
H_3Si–**NO**	158.2 ± 5.7	1
H_3Si–**PH_2**	331.4	1
SiH_3–**F**	638 ± 5	1
SiH_3–**Cl**	458 ± 7	1
SiH_3–**Br**	376 ± 9	1
SiH_3–**I**	299 ± 8	1
GeH_3–**H**	348.9 ± 8.4	1
Me_3Ge–**H**	364.0	1
Ph_3Ge–**H**	359.8	1
$(CH_3)_3Ge$-$Ge(CH_3)_3$	280.3	1
$(CH_3)_3Ge$-CH_3	288.7	1
Me_3Sn–H	326.4	1
Ph_3Sn–**H**	294.6	1
$(CH_3)_3Sn$-$Sn(CH_3)_3$	257.7	1
$(CH_3)_3Sn$-Cl	425 ± 17	1
$(CH_3)_3Pb$-$Pb(CH_3)_3$	228.4	1
Cl_3Pb-Cl	271 ± 84	1
$(CH_3)_3Pb$-CH_3	238 ± 21	1
(8) P-, As-, Sb-, Bi–X BDEs		
H_2P–**H**	351.0 ± 2.1	1
CH_3PH–**H**	322.2 ± 12.6	1
H_2P–PH_2	256.1	1
$(C_2H_5)_2P$–$P(C_2H_5)_2$	359.8	1
F_2P–F	549	1
Cl_2P–Cl	356 ± 8	1
Br_2P–Br	<259	1
I_2P–I	217	1
H_2P–SiH_3	331.4	1
H_2As–H	319.2 ± 0.8	1
H_2Sb-H	288.3 ± 2.1	1
F_2Bi–F	435 ± 19	1
Br_2Bi–Br	>297.1	1
(9) Se- and Te–X BDEs		
H–SeH	334.93 ± 0.75	1
H–SeC_6H_5	326.4 ± 16.7	1
PhSe–SePh	280 ± 19	1
H–TeH	277.0 ± 5.0	1
H–TeC_6H_5	≤264	1
PhTe–TePh	138.1 ± 12.6	1
(10) Metal-Centered BDEs		
Arranged by the Periodic Table		
(10.1) Group 1		
Li–OH	431.0	1
Li–C_2H_5	214.6 ± 8.4	1
Li–nC_4H_9	197.9 ± 16.3	1
Na–OH	342.3	1
Na–O_2	<200	1
K–OH	359	1
Rb–OH	356.2 ± 4.2	1
Cs–OH	373	1
(10.2) Group 2		
BeO–H	469	1
Be(OH)–OH	476	1
MgO–H	441	1
Mg(OH)–OH	349	1
BrMg–CH_3	253	1
BrMg–CH_2CH_3	205	1
BrMg–i-C_3H_7	184	1
BrMg–t-C_4H_9	174	1
BrMg–C_6H_5	289	1
BrMg–$CH_2C_6H_5$	201	1
BrMg–$C(C_6H_5)_3$	180	1
Ca(OH)–OH	409	1
Sr(OH)–OH	407	1
Ba(OH)–OH	443	1
(10.3) Group 3		
Sc–CH_3	116 ± 29	1
Sc–C_6H_6	60.8	1
La(η^5-**C_5Me_5**)$_2$–$CH(SiMe_3)_2$	278.7 ± 10.5	1
Nd(η^5-**C_5Me_5**)$_2$–$CH(SiMe_3)_2$	236.8 ± 10.5	1
(η^5-**C_5Me_5**)$_2$**Sm**–H	226.8 ± 12.6	1
(η^5-**C_5Me_5**)$_2$**Sm**–OCH_3	343.1	1
(η^5-**C_5Me_5**)$_2$**Sm**–(η^3-C_3H_5)	188.3 ± 6.3	1
(η^5-**C_5Me_5**)$_2$**Sm**–S-nC_3H_7	295.4 ± 10.0	1
(η^5-**C_5Me_5**)$_2$**Sm**–$N(CH_3)_2$	201.7 ± 7.5	1
(η^5-**C_5Me_5**)$_2$**Sm**–SiH$(SiMe_3)_2$	179.9 ± 21	1
(η^5-**C_5Me_5**)$_2$**Sm**–$P(Et)_2$	136.4 ± 8.4	1
(η^5-**C_5Me_5**)$_2$**Eu**–I	238.9 ± 8.4	1
(η^5-**C_5Me_5**)$_2$**Yb**–I	256.1 ± 6.3	1
Lu(η^5-**C_5Me_5**)$_2$–$CH(SiMe_3)_2$	279.1 ± 10.5	1
(η^5-**$C_5H_4SiMe_3$**)$_3$**Th**–H	277 ± 6	1
(η^5-**$C_5H_4SiMe_3$**)$_3$**Th**–O	371 ± 24	1
(η^5-**C_5H_5**)$_3$**Th**–CH_3	375 ± 9	1
(η^5-**C_5H_5**)$_3$**Th**–$CH_2Si(CH_3)_3$	369 ± 12	1
$(C_9H_7)_3$Th–$CH_2C_6H_5$	342 ± 9	1
(η^5-**C_5H_4tBu**)$_3$**U**–H	249.7 ± 5.7	1
(η^5-**$C_5H_4SiMe_3$**)$_3$**U**–H	253.7 ± 5.1	1
[HB(3,5-Me_2Pz)$_3$]U(Cl)$_2$–Cl	422.6	1
(η^5-**$C_5H_4SiMe_3$**)$_3$**U**–I	265.6 ± 4.3	1
(η^5-**C_5H_4tBu**)$_3$**U**–O	307 ± 9	1
(η^5-**$C_5H_4SiMe_3$**)$_3$**U**–CO	43.1 ± 0.8	1
$(C_9H_7)_3$U–CH_3	196.3 ± 6.6	1
(η^5-**C_5Me_5**)$_2$**U(Cl)**–C_6H_5	358 ± 11	1
(η^5-**$C_5H_4SiMe_3$**)$_3$**U**–THF	41.0 ± 0.8	1
(10.4) Group 4		
Ti(η^5-**C_5H_5**)$_2$–Cl	471	1
Ti(Cl)(η^5-**C_5H_5**)$_2$–Cl	390	1
Ti(η^5-**C_5Me_5**)$_2$–I	219	1

Bond	D^o_{298}/kJ mol^{-1}	Ref.
Ti(η^5-**C$_5$H$_5$)$_2$**–CO	174	1
Ti(CO)(η^5-**C$_5$H$_5$)$_2$**–CO**	170	1
Ti–CH$_3$	174 ± 29	1
Ti(Cl)(η^5-**C$_5$H$_5$)$_2$**–CH$_3$**	276	1
Ti(Cl)((η^5-**C$_5$H$_5$)$_2$**–C$_6$H$_5$**	292	1
Ti(C$_6$H$_6$)–C$_6$H$_5$	308.7	1
Zr(η^5-**C$_5$Me$_5$)$_2$**–H**	351.0 ± 7.5	1
Zr(H)(η^5-**C$_5$Me$_5$)$_2$**–H**	326.4 ± 4	1
Zr(η^5-**C$_5$Me$_5$)$_2$**–Cl**	481.2	1
Zr(η^5-**C$_5$Me$_5$)$_2$**–Br**	410.0	1
Zr(I)(η^5-**C$_5$Me$_5$)$_2$**–I**	336.4 ± 2.1	1
Zr(η^5-**C$_5$Me$_5$)$_2$**(Ph)**–OH	482.4 ± 6.3	1
Zr(η^5-**C$_5$Me$_5$)$_2$**(Ph)(OH)**–OH	482.8 ± 10.5	1
Zr(η^5-**C$_5$Me$_5$)$_2$**(NH$_2$)H**–NH$_2$	421.3 ± 15.1	1
Zr(η^5-**C$_5$Me$_5$)$_3$**–CH$_3$**	276 ± 10	1
Zr(η^5-**C$_5$H$_5$)$_2$**(C$_6$H$_5$)**–C$_6$H$_5$	300 ± 10	1
Zr(η^5-**C$_5$H$_5$)$_2$**(Si(SiMe$_3$)$_3$)**–SiMe$_3$	188 ± 30	1
Hf(H)(η^5-**C$_5$Me$_5$)$_2$**–H**	346.0 ± 7.9	1
Hf(η^5-**C$_5$Me$_5$)(C$_4$H$_9$)**–C$_4$H$_9$**	274 ± 10	1
(10.5) Group 5		
(η^5-**C$_5$H$_5$)(CO)$_3$V**–η^2H$_2$	90 ± 20	1
(η^5-**C$_5$H$_5$)(CO)$_3$V**–CO	146 ± 21	1
V–CH$_3$	169 ± 18	1
V–C$_6$H$_6$	76.2	1
V(C$_6$H$_6$)–C$_6$H$_6$	307.8	1
Nb(η^5-**C$_5$H$_5$)$_2$H$_3$**–TFE	18.8 ± 1.3	1
Ta(CH$_3$)$_5$–CH$_3$	261 ± 5	1
(Me$_3$SiCH$_2$)$_4$Ta–(CH$_2$SiMe$_3$)	184.1 ± 8.4	1
(10.6) Group 6		
[**Cr(CO)$_3$**(η^5-**C$_5$Me$_5$)**]$_2$**–Hg	61.5	1
[**Cr(CO)$_3$**(η^5-**C$_5$Me$_5$)**]**–Hg	111.3	1
Cr(CO)$_5$–Xe	37.7 ± 3.8	1
(CO)$_2$(PPh$_3$)(η^5-**C$_5$H$_5$)Cr**–H	250.2 ± 4.2	1
(η^5-**C$_5$H$_5$)Cr(CO)$_3$**–H,	257	1
Cr(CO)$_5$–H$_2$	78 ± 4	1
(P(C$_6$H$_{11}$)$_3$)$_2$(CO)$_3$Cr–H$_2$	30.5 ± 0.4	1
(η^6-**C$_6$H$_6$)(CO)$_3$Cr**–H$_2$	251 ± 17	1
Cr(CO)$_5$–N$_2$	81 ± 4	1
(P(C$_6$H$_{11}$)$_3$)$_2$(CO)$_3$Cr–N$_2$	38.9 ± 0.8	1
(η^5-**C$_5$Me$_5$)(CO)$_3$Cr**–SH	193	1
Cr(CO)$_5$–CO	154.0 ± 8.4	1
Cr(CO)$_5$–CH$_4$	~33.5 ± 8	1
Cr–C$_6$H$_6$	9.6 ± 5.8	1
Cr(C$_6$H$_6$)–C$_6$H$_6$	268.2 ± 15.4	1
Cr(CO)$_5$–C$_6$H$_6$	57.3 ± 3.3	1
(P(C$_6$H$_{11}$)$_3$)$_2$(CO)$_3$Cr–P(OMe$_3$)$_3$	68.6 ± 2.5	1
(η^5-**C$_5$H$_5$)**)**Mo(CO)$_3$**–H	290	1
Mo(η^5-**C$_5$H$_5$)$_2$**–H**	246	1
Mo(H)(η^5-**C$_5$H$_5$)$_2$**–H**	256.9 ± 8.4	1
Mo(CO)$_3$(η^5-**C$_5$H$_5$)**–I**	216.7 ± 4.2	1
(η^5-**C$_5$Me$_5$)$_2$Mo**–O	272	1
(P(C$_6$H$_{11}$)$_3$)$_2$(CO)$_3$Mo–H$_2$	27.2 ± 0.8	1
(P(C$_6$H$_{11}$)$_3$)$_2$(CO)$_3$Mo–N$_2$	37.7 ± 2.5	1
Mo(CO)$_5$–CO	169.5 ± 8.4	1
Mo(CO)$_3$ (η^5-**C$_5$H$_5$)**–CH$_3$	203 ± 8	1
W(CO)$_5$–Xe	35.1 ± 0.8	1
W(CO)$_3$(η^5-**C$_5$H$_5$)**–H**	303	1
W(H)(η^5-**C$_5$H$_5$)$_2$**–H**	310.9 ± 4.2	1
W(I)(η^5-**C$_5$H$_5$)$_2$**–H**	273 ± 14	1
(CO)$_5$W–H$_2$	≥67	1
(P(C$_6$H$_{11}$)$_3$)(CO)$_3$W–(η^2-H$_2$)	28.5 ± 2.1	1
W(CO)$_5$–CO	192.5 ± 8.48.4	1
W(CH$_3$)(η^5-**C$_5$H$_5$)$_2$**–CH$_3$**	220.9 ± 4	1
(10.7) Group 7		
F$_3$Mn–MnF$_3$	210.9 ± 2.5	1
(CO)$_5$Mn–Mn(CO)$_5$	185 ± 8	1
(CO)$_5$Mn–H	284.5	1
(PPh$_3$)Mn(CO)$_4$–H	286.2	1
MnBr(CO)$_4$–CO	184	1
(η^5-**C$_5$H$_5$)(CO)$_2$Mn**–CO	195.8 ± 9.2	1
Mn–CH$_3$	>35 ± 12	1
Mn(CO)$_5$–CH$_3$	187.0 ± 3.8	1
Mn(CO)$_5$–C$_6$H$_5$	207 ± 11	1
(CO)$_5$Mn–Re(CO)$_5$	149 ± 11	1
(η^5-**C$_5$H$_5$)Mn(CO)$_2$**–PhMe	59.4 ± 3.3	1
(CO)$_5$Tc–Tc(CO)$_5$	177.5 ± 1.9	1
(CO)$_5$Re–Re(CO)$_5$	187 ± 4.8	1
(CO)$_5$Re–H	313	1
(CO)$_5$Re–CH$_3$	220 ± 8	1
(10.8) Group 8		
(CO)$_4$Fe–Fe(CO)$_5$	171.5	1
(CO)$_4$Fe(H)$_x$–H	259.4 ± 8.4	1
(η^5-**C$_5$H$_5$)(CO)$_2$Fe**–H	239	1
Fe(CO)$_3$(N$_2$)–N$_2$	37.7 ± 19.2	1
Fe(C$_2$H$_2$)(CO)$_4$–CO	88 ± 2.3	1
Fe(CO)$_2$(PMe$_3$)–CO	>125	1
Fe(CO)$_3$(PPh$_3$)–CO	<177.8 ± 5	1
Fe–NH$_3$	31.4 ± 4.2	1
Fe–CH$_2$	364 ± 29	1
Fe–CH$_3$	135 ± 29	1
Fe(C$_2$H$_4$)(CO)$_3$–C$_2$H$_4$	89.1 ± 8	1
Fe–C$_3$H$_5$	218	1
Fe–C$_3$H$_6$	79	1
Fe(CO)$_5$–Ni(CO)$_4$	37.7	1
Fe(CO)$_5$–(η^3-C$_3$H$_5$)	176	1
Fe(C$_3$H$_6$)(CO)$_3$–C$_3$H$_6$	~79.5	1
(CO$_2$)(η^5-**C$_5$H$_5$)Ru**–H	272	1
(PMe$_3$)$_2$(η^5-**C$_5$Me$_5$)Ru**–H	167.4	1
(CO)$_2$(η^5-**C$_5$Me$_5$)Ru**–Cl	337.6	1
(η^5-**C$_5$Me$_5$)(PMe$_3$)$_2$Ru**–Cl	<138	1
(η^5-**C$_5$Me$_5$)(PMe$_3$)$_2$Ru**–OH	204.6	1
(CO)$_4$Ru–CO	115 ± 1.7	1
(η^5-**C$_5$Me$_5$)(PMe$_3$)$_2$Ru**–CH$_3$	142.3	1
Os(H)(CO)$_4$–H	326.4	1
(CO)$_4$Os–CO	133 ± 2.6	1
Os(C$_2$H$_2$)(CO)$_4$–CO	99.5 ± 0.8	1
(10.9) Group 9		
(CO)$_4$Co–Co(CO)$_4$	83 ± 29	1
(CO)$_4$Co–Mn(CO)$_5$	96 ± 12	1
(CO)$_4$Co–Re(CO)$_5$	113 ± 15	1
Co(CO)$_4$–H	278	1
Co(CO)$_3$)(PPh$_3$)–H	272	1
(CO)$_3$HCo–CO	~54	1
(η^5-**C$_5$H$_5$)Co(CO)**–CO	184.3 ± 4.8	1
Co–CH$_2$	331 ± 38	1
Co–CH$_3$	178 ± 8	1
cobalamin–CH$_3$	150.6	1
cobinamide–iC$_4$H$_9$	104	1
Co–C bonds in B$_{12}$	123.8 ± 6.3	1
Cl(CO)$_2$Rh–Rh(CO)$_2$Cl	94.6	1
HRh(m-xylyl)Rh–H	255.6 ± 1.7	1
(PiPr$_3$)$_2$(Cl)Rh–H$_2$	136.0	1
(PiPr$_3$)$_2$(Cl)Rh–N$_2$	69.0	1
(PiPr$_3$)$_2$(Cl)Rh–CO	201.7	1
HRh(m-xylyl)Rh–CH$_2$OH	195.4 ± 7.5	1
Ir(Cl)(CO)(PMe$_3$)$_2$–H	251	1
Ir(H)(η^5-**C$_5$Me$_5$)(PMe$_3$)**–H	310.5 ± 21	1
Ir(Cl)(H)(CO)(PEt$_3$)$_2$–H	243.1	1
Ir(Cl)(H)(CO)(PPh$_3$)$_2$–H	246.9	1
(Cl)(CO)(PPh$_3$)$_2$Ir–H$_2$	62.8	1
(Cl)(CO)(PPh$_3$)$_2$Ir–CO	45.2	1
Ir(H)(η^5-**C$_5$Me$_5$)(PMe$_3$)**–C$_6$H$_5$	321	1
(10.10) Group 10		
Ni–H$_2$O	~29	1
Ni(CO)$_3$–N$_2$	~42	1

Bond	D^o_{298}/kJ mol^{-1}	Ref.
Ni(CO)$_3$–CO	104.6 ± 8.4	1
Ni–CH$_3$	208 ± 8	1
Ni–C$_2$H$_2$	193 ± 25	1
Ni–C$_2$H$_4$	147.3 ± 17.6	1
Ni–propyne	155 ± 21	1
Ni–2-butyne	121 ± 21	1
Pd–OH	213	1
***trans*-Pt(PPh$_3$)$_2$(Cl)**–H	307 ± 37	1
[Ph$_2$PCH$_2$]$_2$MePt–H	104.6	1
[Ph$_2$PCH$_2$]$_2$MePt –OH	167.4	1
[Ph$_2$PCH$_2$]$_2$MePt –SH	90.0	1
Pt(η^5-C$_5$H$_5$)(CH$_3$)$_2$–CH$_3$	163 ± 21	1
***cis*-Pt(PEt$_3$)$_2$(CH$_3$)**–CH$_3$	269 ± 13	1
(10.11) Group 11		
Cu–OH	>406	1
Cu–CO	25 ± 5	1
Cu–CH$_3$	223 ± 5	1
Cu–NH$_3$	47 ± 15	1
Cu(NH$_3$)–NH$_3$	83.7 ± 4.2	1
Cu–C$_6$H$_6$	16.4 ± 12.5	1
Cu(C$_6$H$_6$)–C$_6$H$_6$	27.0 ± 19.3	1
Ag–CH$_3$	134.1 ± 6.8	1
Ag–NH$_3$	8 ± 13	1
Ag(NH$_3$)–NH$_3$	62.8 ± 4.2	1
Au–OH	>262	1
Au–NH$_3$	76 ± 6	1
Au–CH$_3$	≥191.6	1
Au–C$_6$H$_6$	8.4	1
(10.12) Group 12		
Zn–CH$_3$	70 ± 10	1
Zn(CH$_3$)–CH$_3$	266.5 ± 6.3	1
Zn–C$_2$H$_5$	92.0 ± 17.6	1
Zn(C$_2$H$_5$)–C$_2$H$_5$	219.2 ± 8.4	1
Cd–CH$_3$	63.6 ± 10.0	1
Cd(CH$_3$)–CH$_3$	234.3 ± 6.3	1
Hg–CH$_3$	22.6 ± 12.6	1
Hg(CH$_3$)–CH$_3$	239.3 ± 6.3	1
ClHg–CH$_3$	280.0 ± 12.6	1
BrHg–CH$_3$	270 ± 38	1
IHg–CH$_3$	258.6 ± 12.6	1
(10.13) Group 13		
H$_3$B–BH$_3$	172	1
H$_3$B–NH$_3$	130.1 ± 4.2	1
(CH$_3$)$_3$B–NH$_3$	57.7 ± 1.3	1
F$_3$B–N(CH$_3$)$_3$	130 ± 4.6	1
Cl$_3$B–N(CH$_3$)$_3$	127.6	1
F$_2$B–CH$_3$	397 - 418	1
Al–OH	547 ± 13	1
Al–C$_2$H$_2$	>54	1
Cl$_3$Al–N(CH$_3$)$_3$	198.7 ± 8.4	1
(CH$_3$)$_3$Al–N(CH$_3$)$_3$	130	1
(CH$_3$)$_3$Al–O(CH$_3$)$_2$	92	1
(CH$_3$)$_3$Ga–O(C$_2$H$_5$)$_2$	50.6 ± 0.8	1
Cl$_3$Ga-S(C$_2$H$_5$)$_2$	235.1	1
In–CH$_3$	216.3	1
In(CH$_3$)$_1$–CH$_3$	318.8	1
In(CH$_3$)$_2$–CH$_3$	587.4	1
(CH$_3$)$_3$In–N(CH$_3$)$_3$	83.3 ± 2.1	1
Tl–OH	330 ± 30	1

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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	$\Delta_f H^o_{298}$/kJ mol^{-1}	Ref.
(1) Carbon-Centered Species		
CH	595.8 ± 0.6	1
CH$_2$ (triplet)	391.2 ± 1.6	1
CH$_2$ (singlet)	428.8 ± 1.6	1
•CH$_3$, methyl	146.7 ± 0.3	1
•C$_2$H, acetenyl, CH≡C•	567.4 ± 2.1	1
•C$_2$H$_2$, vinylidene CH$_2$=C••	419.7 ± 16.7	1
•C$_2$H$_3$, vinyl, CH$_2$=C•H	299.6 ± 3.3	1
•C$_2$H$_5$, ethyl, CH$_3$C•H$_2$	118.8 ± 1.3	1
•C$_3$H$_3$, propargyl, CH≡CC•H$_2$	351.9	2
•C$_3$H$_3$, CH$_3$C≡C•	515 ± 13	1
•C$_3$H$_3$, CH$_2$=C=CH• ↔ CH≡CC•H$_2$	351.9	2
•C$_3$H$_3$, cyclopro-2-en-1-yl	439.7 ± 17.2	1
•C$_3$H$_5$, allyl, CH$_2$=CHC•H$_2$	171.0 ± 3.0	1
•C$_3$H$_5$, CH$_3$CH=C•H	267 ± 6	1
•C$_3$H$_5$, CH$_3$C•=CH$_2$	231.4	1
•C$_3$H$_5$, cyclopropyl	279.9 ± 10.5	1
n-C$_3$H$_7$•, n-propyl, CH$_3$CH$_2$C•H$_2$	100 ± 2	1
i-C$_3$H$_7$•, i-propyl, CH$_3$C•HCH$_3$	88 ± 3	1
•n-C$_4$H$_3$, CH≡CCH=C•H	547.3	1
•i-C$_4$H$_3$, CH$_2$=C•C≡CH	499.2	1
•C$_4$H$_5$, CH$_3$C≡CC•H$_2$	304.5	1
•C$_4$H$_5$, CH≡CC•HCH$_3$	316.5	1
•C$_4$H$_5$, •CH=CHCHCH$_2$	364.4	1
•C$_4$H$_5$, CH$_2$=CHC•CH$_2$	313.3	1
•C$_4$H$_7$, CH$_3$CH=CHC•H$_2$	146 ± 8	1
•C$_4$H$_7$, CH$_2$=CHCH$_2$C•H$_2$	192.5	1
•C$_4$H$_7$, CH$_2$=C(CH$_3$)C•H$_2$	137.9	1
•C$_4$H$_7$, CH$_2$=CHC•HCH$_3$	136.2	1
•C$_4$H$_7$, cyclopropylmethyl	213.8 ± 6.7	1
•C$_4$H$_7$, cyclobutyl	219.2 ± 4.2	1
n-C$_4$H$_9$•, n-butyl, CH$_3$CH$_2$CH$_2$C•H$_2$	77.8 ± 2.1	1
i-C$_4$H$_9$•, i-butyl, (CH$_3$)$_2$CHC•H$_2$	70 ± 4	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	$\Delta_f H^o_{298}$/kJ mol^{-1}	Ref.
$^{\bullet}C_5H_3$, CH≡C-C≡CC$^{\bullet}H_2$	579.1	1
$^{\bullet}C_5H_3$, $(CH{\equiv}C)_2C^{\bullet}H$	573.2	1
$^{\bullet}C_5H_5$, CH_2=CHC≡CC$^{\bullet}H_2$	351.5	1
$^{\bullet}C_5H_5$, CH_2=CH-C$^{\bullet}$H-C≡CH	372.4	1
$^{\bullet}C_5H_5$, cyclopenta-1,3-dien-5-yl	274.1 ± 7.3	1
$^{\bullet}C_5H_7$, $CH_3C{\equiv}CC^{\bullet}HCH_3$	272.8 ± 9.2	1
$^{\bullet}C_5H_7$, $CH{\equiv}CC^{\bullet}HC_2H_5$	277.0 ± 8.4	1
$^{\bullet}C_5H_7$, $CH{\equiv}CC^{\bullet}(CH_3)_2$	257.3 ± 9.2	1
$^{\bullet}C_5H_7$, CH_2=CHCH=CHC$^{\bullet}H_2$	205.0 ± 12.6	1
$^{\bullet}C_5H_7$, $(CH_2{=}CH)_2C^{\bullet}H$	208.0 ± 4.2	1
$^{\bullet}C_5H_7$, CH_3CH=C=CHC$^{\bullet}H_2$	278.0	1
$^{\bullet}C_5H_7$, spiropentyl	380.7 ± 4.2	1
$^{\bullet}C_5H_7$, cyclopent-1-en-3-yl	160.7 ± 4.2	1
$^{\bullet}C_5H_9$, cyclopentyl	105.9 ± 4.2	1
$^{\bullet}C_5H_9$, CH_2=CHC$^{\bullet}HCH_2CH_3$	109.6 ± 8.4	1
$^{\bullet}C_5H_9$, CH_3CH=CHC$^{\bullet}H(CH_3)$	92	1
$^{\bullet}C_5H_9$, CH_3CH=C$(CH_3)C^{\bullet}H_2$	92.0	1
$^{\bullet}C_5H_9$, CH_2=CHC$^{\bullet}(CH_3)_2$	87.0 ± 8.4	1
$^{\bullet}C_5H_9$, CH_2=C$(CH_3)C^{\bullet}H(CH_3)$	93.7	1
$^{\bullet}C_5H_9$, CH_2=C$(C^{\bullet}H_2)CH_2CH_3$	114.2	1
$^{\bullet}C_5H_9$, CH_2=CH$(CH_2)_2C^{\bullet}H_2$	179.5	1
$nC_5H_{11}^{\bullet}$, $CH_3CH_2CH_2CH_2C^{\bullet}H_2$	54.4	1
$^{\bullet}C_5H_{11}$, $(C_2H_5)_2C^{\bullet}H$	47.0	1
$^{\bullet}C_5H_{11}$, $(nC_3H_7)(CH_3)C^{\bullet}H$	50.2	1
$^{\bullet}C_5H_{11}$, $(CH_3)_3C^{\bullet}CH_2$	36.4 ± 8.4	1
$^{\bullet}C_5H_{11}$, $(C_2H_5)(CH_3)_2C^{\bullet}$	29	1
$^{\bullet}C_6H_5$, phenyl	330.1 ± 3.3	1
$^{\bullet}C_6H_7$, cyclohexa-1,3-dien-5-yl	199.2	1
$^{\bullet}C_6H_7$, cyclohexa-1,4-dien-3-yl	208.0 ± 3.9	5
$^{\bullet}C_6H_9$, $CH_3C{\equiv}CC^{\bullet}(CH_3)_2$	221.8 ± 9.2	1
$^{\bullet}C_6H_9$, $(CH_2{=}CH)_2C^{\bullet}(CH_3)$	193.7	1
$^{\bullet}C_6H_9$, cyclohexa-1-en-3-yl	119.7	1
$^{\bullet}C_6H_{11}$, CH_2=CH$(CH_2)_3C^{\bullet}H_2$	158.6	1
$^{\bullet}C_6H_{11}$, CH_2=CHC$^{\bullet}H(CH_2)_2CH_3$	89.0	1
$^{\bullet}C_6H_{11}$, CH_2=C$(CH_3)C^{\bullet}(CH_3)_2$	37.7 ± 6.3	1
$^{\bullet}C_6H_{11}$, $(CH_3)_2C$=C$(CH_3)C^{\bullet}H_2$	39.7 ± 6.3	1
$^{\bullet}C_6H_{11}$, $(CH_3)_2C$=CHC$^{\bullet}H(CH_3)$	47.3	1
$^{\bullet}C_6H_{11}$, (Z)-CH_3CH=CHC$^{\bullet}(CH_3)_2$	54.4	1
$^{\bullet}C_6H_{11}$, cyclohexyl	75.3 ± 6.3	1
$nC_6H_{13}^{\bullet}$, $CH_3CH_2CH_2CH_2CH_2C^{\bullet}H_2$	33.5	1
$^{\bullet}C_6H_{13}$, $(nC_4H_9)(CH_3)C^{\bullet}H$	29.3	1
$^{\bullet}C_6H_{13}$, 2-methyl-2-pentyl	3.3 ± 8.4	1
$^{\bullet}C_6H_{13}$, 3-methyl-3-pentyl	14.2	1
$^{\bullet}C_6H_{13}$, 2,3-dimethyl-2-butyl	3.1 ± 10	1
$^{\bullet}C_7H_3$, $(CH{\equiv}C)_3C^{\bullet}$	784.5	1
$^{\bullet}C_7H_7$, benzyl, $C_6H_5C^{\bullet}H_2$	208.0 ± 1.7	1
$^{\bullet}C_7H_7$, quadricyclolan-5-yl	578.6 ± 5.4	1
$^{\bullet}C_7H_7$, quadricyclolan-4-yl	587.4 ± 5.4	1
$^{\bullet}C_7H_7$, norborna-2,5-dien-7-yl	511.7 ± 7.9	1
$^{\bullet}C_7H_7$, cyclohepta-1,3,5-trien-7-yl	285.3 ± 12.6	1
$^{\bullet}C_7H_9$, CH_2=CH(CH=CH)$_2$CC$^{\bullet}H_2$	251.0	1
$^{\bullet}C_7H_9$, $(CH_2{=}CH)_3C^{\bullet}$	274.0	1
$^{\bullet}C_7H_{11}$, norborn-1-yl	136.4 ± 10.5	1
$^{\bullet}C_7H_{11}$, cycloheptenyl	119.2	1
$^{\bullet}C_7H_{13}$, cycloheptyl	50.6 ± 4.2	1
$^{\bullet}C_7H_{13}$, cyclo-[$C^{\bullet}(CH_3)(CH_2)_5$]	22.6	1
$^{\bullet}C_7H_{13}$, cyclo-[$C^{\bullet}(CH_2CH_3)(CH_2)_4$]	47.0	1
$^{\bullet}C_7H_{15}$, $(nC_5H_{11})(CH_3)CH^{\bullet}$	8.4	1
$^{\bullet}C_7H_{15}$, $(CH_3)_2CHCHC^{\bullet}(CH_3)_2$	−21.8 ± 5.2	1
$^{\bullet}C_8H_7$, cubyl	831.0 ± 16.7	1
$^{\bullet}C_8H_7$, $C_6H_5C^{\bullet}$=CH_2	309.6	1
$^{\bullet}C_8H_7$, C_6H_5CH=CH$^{\bullet}$	387.0	1
$^{\bullet}C_8H_9$, $C_6H_5C^{\bullet}H(CH_3)$	175.7 ± 7.5	1
$^{\bullet}C_8H_9$, $C_6H_5CH_2C^{\bullet}H_2$	236.0 ± 7.5	1
$^{\bullet}C_8H_9$, p-$CH_3C_6H_4C^{\bullet}H_2$	167.4	1
$^{\bullet}C_8H_9$, m-$CH_3C_6H_4C^{\bullet}H_2$	167.4	1
$^{\bullet}C_8H_9$, o-$CH_3C_6H_4C^{\bullet}H_2$	167.4	1
$^{\bullet}C_8H_9$, 1-vinyl-cyclohexa-2,4-dienyl	247.7 ± 14.2	1
$^{\bullet}C_8H_9$, 2-vinyl-cyclohexa-2,4-dienyl	249.8 ± 14.2	1
$^{\bullet}C_8H_9$, 3-vinyl-cyclohexa-2,4-dienyl	269.4 ± 14.2	1
$^{\bullet}C_8H_9$, 6-vinyl-cyclohexa-2,4-dienyl	284.5 ± 14.2	1
$^{\bullet}C_8H_{13}$, CH_2=CHCH=CHC$^{\bullet}H(CH_2)_2CH_3$	130.5	1
$^{\bullet}C_8H_{13}$, CH_2=CHC$^{\bullet}H(CH_2)_3CH$=CH_2	130.5	1
$^{\bullet}C_8H_{13}$, bicyclooct-1-yl	92.0	1
$^{\bullet}C_8H_{15}$, CH_2=CHC$^{\bullet}H(CH_2)_4CH_3$	49.8	1
$^{\bullet}C_8H_{15}$, (E)-CH_3CH=C$^{\bullet}(CH_2)_4CH_3$	29.7	1
$^{\bullet}C_8H_{15}$, (Z)-$(CH_3)_2C^{\bullet}CH$=CHCH$(CH_3)_2$	9.2	1
$^{\bullet}C_8H_{15}$, cyclooctanyl	59.4	1
$^{\bullet}C_8H_{15}$, cyclo-[$C^{\bullet}(CH_2CH_3)(CH_2)_5$]	10.0	1
$^{\bullet}C_9H_7$, indenyl	297.1	1
$^{\bullet}C_9H_9$, indanyl-1	204.2 ± 8.4	1
$^{\bullet}C_9H_{11}$, 2,6-dimethylbenzyl	124.7	1
$^{\bullet}C_9H_{11}$, 3,6-dimethylbenzyl	124.7	1
$^{\bullet}C_9H_{11}$, 3,5-dimethylbenzyl	124.7	1
$^{\bullet}C_9H_{11}$, $C_6H_5C^{\bullet}(CH_3)_2$	133.9 ± 4.2	1
$^{\bullet}C_9H_{11}$, o-$^{\bullet}C_6H_4C_2H_5$	279.5 ± 7.5	1
$^{\bullet}C_9H_{17}$, cyclononanyl	52.3	1
$^{\bullet}C_{10}H_7$, naphth-1-yl	401.7 ± 5.4	1
$^{\bullet}C_{10}H_7$, naphth-2-yl	400.4 ± 5.9	1
$^{\bullet}C_{10}H_{11}$, tetralin-1-yl	154.8 ± 5.0	1
$^{\bullet}C_{10}H_{13}$, 1-phenyl-but-4-yl	192.0	1
$^{\bullet}C_{10}H_{13}$, $(C_6H_5CH_2)(C_2H_5)C^{\bullet}H$	184.5	1
$^{\bullet}C_{10}H_{13}$, $(C_6H_5CH_2CH_2)(CH_3)C^{\bullet}H$	184.5	1
$^{\bullet}C_{10}H_{13}$, $(C_6H_5C^{\bullet}HCH_2CH_2CH_3$	134.7	1
$^{\bullet}C_{10}H_{15}$, 1-adamantyl	51.5	1
$^{\bullet}C_{10}H_{15}$, 2-adamantyl	61.9	1
$^{\bullet}C_{10}H_{19}$, cyclodecanyl	32.2	1
$^{\bullet}C_{11}H_9$, 1-naphthylmethyl	252.7	1
$^{\bullet}C_{11}H_{21}$, cycloundecanyl	7.5	1
$^{\bullet}C_{12}H_{23}$, cyclododecanyl	−38.5	1
$^{\bullet}C_{13}H_9$, 9-fluorenyl	297.5	1
$^{\bullet}C_{13}H_{11}$, $(C_6H_5)_2C^{\bullet}H$	302.1 ± 4.2	1

Radical	$\Delta_f H°_{298}$/kJ mol^{-1}	Ref.
$^{\bullet}C_{13}H_{11}$, 9-methyl-9-fluorenyl	268.2	1
$^{\bullet}C_{14}H_{11}$, 9,10-dihydroanthracen-9-yl	261.0	1
$^{\bullet}C_{15}H_{11}$, 9-anthracenylmethyl	337.6	1
$^{\bullet}C_{15}H_{11}$, 9-phenanthrenylmethyl	311.3	1
$^{\bullet}C_{16}H_{31}$, CH_2=CHC$^{\bullet}$H$(CH_2)_{12}CH_3$	−118.8	1
$^{\bullet}C_{19}H_{15}$, trityl, $(C_6H_5)_3C^{\bullet}$	392.0 ± 8.4	1
$^{\bullet}C_{35}H_{25}$, pentamethylcyclopentadienyl	67.4	1
CF	255.2 ± 8	1
CF_2	−182.0 ± 6.3	1
FC$^{\bullet}$(O)	−161.2 ± 8.4	1
CHF	143.0 ± 12.6	1
CClF	31.0 ± 13.4	1
CCl	443.1 ± 13.0	1
CCl_2	226	1
ClC$^{\bullet}$(O)	−21.8 ± 2.5	1
CHCl	326.4 ± 8.4	1
CClBr	267	1
CBr	510 ± 63	1
CHBr	373 ± 18	1
CBr_2	343.5	1
CI	570 ± 35	1
CI_2	468 ± 60	1
$^{\bullet}CF_3$	−465.7 ± 2.1	1
$^{\bullet}CHF_2$	−238.9 ± 4.2	1
$^{\bullet}CH_2F$	−31.8 ± 4.2	1
$^{\bullet}CClF_2$	−279.0 ± 8.4	1
$^{\bullet}CCl_2F$	−89.0 ± 8.4	1
$^{\bullet}$CBrClF	−35.5 ± 6.3	1
$^{\bullet}$CHClF	−60.7 ± 10.0	1
$^{\bullet}CBrF_2$	−224.7 ± 12.6	1
$^{\bullet}CCl_3$	71.1 ± 2.5	1
$^{\bullet}CHCl_2$	87.1 ± 1.6	1
$^{\bullet}CH_2Cl$	117.2 ± 2.9	1
$^{\bullet}$CHBrCl	140 ± 4	1
$^{\bullet}CHBr_2$	199.1 ± 2.7	3
$^{\bullet}CBr_2Cl$	163 ± 8	1
$^{\bullet}CBrCl_2$	124 ± 8	1
$^{\bullet}CBr_3$	214.8	1
$^{\bullet}CH_2Br$	171.1 ± 2.7	1
$^{\bullet}CI_3$	424.9 ± 2.8	1
$^{\bullet}CHI_2$	314.4 ± 3.3	1
$^{\bullet}CH_2I$	229.7 ± 8.4	1
$^{\bullet}C_2F$, FC≡C$^{\bullet}$	460.0 ± 21.0	1
$^{\bullet}C_2Cl$, ClC≡C$^{\bullet}$	568 ± 26	1
$^{\bullet}C_2F_3$, CF_2=C$^{\bullet}$F	−192.0 ± 8.4	1
$^{\bullet}C_2F_2H$, CF_2=C$^{\bullet}$H	−92.9 ± 8.4	1
$^{\bullet}C_2F_2H$, CHF=C$^{\bullet}$F	−50.6 ± 8.4	1
$^{\bullet}CCl_2H$, CHCl=C$^{\bullet}$Cl	234.7 ± 8.4	1
$^{\bullet}CClH_2$, CH_2=C$^{\bullet}$Cl	>251	1
$^{\bullet}C_2F_5$, $CF_3C^{\bullet}F_2$	−892.9 ± 4.2	1
$^{\bullet}C_2HF_4$, $CF_3C^{\bullet}$HF	−680.8 ± 9.6	1
$^{\bullet}C_2HF_4$, $CHF_2C^{\bullet}F_2$	−664.8	1
$^{\bullet}C_2H_2F_3$, $CF_3C^{\bullet}H_2$	−517.1 ± 8.4	1
$^{\bullet}C_2H_2F_3$, $CHF_2C^{\bullet}$HF	−456.0	1
$^{\bullet}C_2H_2F_3$, $CH_2FC^{\bullet}F_2$	−449.8	1
$^{\bullet}C_2H_2F_2Cl$, $CF_2ClC^{\bullet}H_2$	−310.9 ± 7.0	1
$^{\bullet}C_2H_3F_2$, $CH_3C^{\bullet}F_2$	−302.5 ± 8.4	1
$^{\bullet}C_2H_3F_2$, $CHF_2C^{\bullet}H_2$	−285.8	1
$^{\bullet}C_2H_3F_2$, $CH_2FC^{\bullet}$HF	−238.5	1
$^{\bullet}C_2H_4F$, $CH_3C^{\bullet}$HF	−70.3 ± 8.4	1
$^{\bullet}C_2H_4F$, $CH_2FC^{\bullet}H_2$	−59.4 ± 8.4	1
$^{\bullet}C_2H_2F_2Cl$, $CF_2ClC^{\bullet}H_2$	−315.2 ± 6	1
$^{\bullet}C_2F_4Cl$, $CF_2ClC^{\bullet}F_2$	−686.0	1
$^{\bullet}C_2HF_3Cl$, $CClF_2C^{\bullet}$HF	−450.6 ± 12.6	1
$^{\bullet}C_2F_4Cl$, $CF_3C^{\bullet}$FCl	−728.0	1
$^{\bullet}C_2F_3Cl_2$, $CF_3C^{\bullet}Cl_2$	−564.0	1
$^{\bullet}C_2F_3ClBr$, $CF_3C^{\bullet}$ClBr	−504.2 ± 8.4	1
$^{\bullet}C_2Cl$, ClC≡C$^{\bullet}$	534 ± 50	1
$^{\bullet}C_2Cl_3$, CCl_2=C$^{\bullet}$Cl	190 ± 50	1
$^{\bullet}C_2Cl_5$, $CCl_3C^{\bullet}Cl_2$	35.1 ± 5.4	1
$^{\bullet}C_2HCl_4$, $CHCl_2C^{\bullet}Cl_2$	23.4 ± 8.4	1
$^{\bullet}C_2HCl_4$, $CCl_3C^{\bullet}$HCl	51.0	1
$^{\bullet}C_2H_2Cl_3$, $CH_2ClC^{\bullet}Cl_2$	26.4	1
$^{\bullet}C_2H_2Cl_3$, $CHCl_2C^{\bullet}$HCl	46.4	1
$^{\bullet}C_2H_2Cl_3$, $CCl_3C^{\bullet}H_2$	71.5 ± 8	1
$^{\bullet}C_2H_3Cl_2$, $CH_3C^{\bullet}Cl_2$	42.5 ± 1.7	1
$^{\bullet}C_2H_3Cl_2$, $CH_2ClC^{\bullet}$ClH	65.3	1
$^{\bullet}C_2H_3Cl_2$, $CHCl_2C^{\bullet}H_2$	90.1 ± 0.8	1
$^{\bullet}C_2H_4Cl$, $CH_3C^{\bullet}$HCl	76.5 ± 1.6	1
$^{\bullet}C_2H_4Cl$, $CH_2ClC^{\bullet}H_2$	93.0 ± 2.4	1
$^{\bullet}C_2H_3Br_2$, $CH_3C^{\bullet}Br_2$	140.2 ± 5.4	1
$^{\bullet}C_2H_4Br$, $BrCH_2C^{\bullet}H_2$	135.1	1
$^{\bullet}C_2H_4Br$, $CH_3C^{\bullet}$HBr	133.4 ± 3.4	3
$^{\bullet}C_2Br$, CBrC$^{\bullet}$	623.8	1
$^{\bullet}C_2Br_3$, $CBr_2C^{\bullet}$Br	385.3	1
$^{\bullet}C_2Br_5$, $CBr_3C^{\bullet}Br_2$	283.3	1
$^{\bullet}C_3H_6Cl$, $CH_3CH_2C^{\bullet}$HCl	56.6	1
$^{\bullet}C_3H_6Cl$, $CH_3C^{\bullet}ClCH_3$	29.9 ± 0.6	1
$^{\bullet}C_3H_6Br$, $C^{\bullet}H_2CH_2CH_2Br$	120.1 ± 1.3	1
$^{\bullet}C_3H_6Br$, $CH_3C^{\bullet}HCH_2Br$	96.7 ± 5.9	1
$^{\bullet}C_3H_6Br$, $CH_3CH_2C^{\bullet}$HBr	107.5 ± 2.5	1
$^{\bullet}C_6F_5$	−547.7 ± 8.4	1
$^{\bullet}CH_3O$, $HOC^{\bullet}H_2$	−17.0 ± 0.7	1
$^{\bullet}CH_2ClO$, $HOC^{\bullet}$ClH	−60.7 ± 7.5	1
$^{\bullet}CHCl_2O$, $HOC^{\bullet}Cl_2$	−94.1 ± 7.5	1
$^{\bullet}CH_2ClO$, $ClOC^{\bullet}H_2$	135.6 ± 9.2	1
$^{\bullet}CH_2BrO$, $BrOC^{\bullet}H_2$	151 ± 16	1
$^{\bullet}C_2H_3O$, C$^{\bullet}$H=CHOH	121 ± 11	1
$^{\bullet}C_2H_3O$, $C^{\bullet}H_2CHO$	13.0 ± 2	1
$^{\bullet}C_2H_5O$, $CH_3C^{\bullet}$HOH	−54.0	1
$^{\bullet}C_2H_4ClO$, $CH_3C^{\bullet}$ClOH	−108.4 ± 8.8	1
$^{\bullet}C_2H_4ClO$, $C^{\bullet}H_2CHClOH$	−73.2 ± 8.8	1

Radical	$\Delta_f H°_{298}$/kJ mol^{-1}	Ref.
$^{\bullet}C_2H_3Cl_2O$, $C^{\bullet}H_2CCl_2OH$	−99.6 ± 8.8	1
$^{\bullet}C_2H_5O$, $C^{\bullet}H_2CH_2OH$	−31 ± 7	1
$^{\bullet}C_2H_3O$, oxiran-2-yl	149.8 ± 6.3	1
$^{\bullet}C_3H_5O$,CH_2=CHC$^{\bullet}$HOH	0 ± 8.4	1
$^{\bullet}C_3H_7O$, $CH_3CH_2C^{\bullet}HOH$	−81 ± 4	1
$^{\bullet}C_3H_7O$, $(CH_3)C^{\bullet}HCH_2OH$	−78.7 ± 8.4	1
$^{\bullet}C_3H_7O$, $HOCH_2CH_2C^{\bullet}H_2$	−66.9 ± 8.4	1
$^{\bullet}C_3H_7O$, $(CH_3)_2C^{\bullet}OH$	−96.4	1
$^{\bullet}C_3H_7O$, $^{\bullet}CH_2CH(OH)CH_3$	−62.8 ± 11.7	1
$^{\bullet}C_4H_9O$, $^{\bullet}CH_2C(OH)(CH_3)_2$	−147.3 ± 8.4	1
$^{\bullet}C_2H_5O_3$, $C^{\bullet}H_2OCH_2OOH$	109.6 ± 4.2	1
PhC$^{\bullet}$HOH	29.3 ± 8.4	1
$Ph_2C^{\bullet}OH$	152.3 ± 6.3	1
$^{\bullet}C_2H_5O$, $CH_3OC^{\bullet}H_2$	0 ± 4.2	1
$^{\bullet}C_3H_7O$, $CH_3OC^{\bullet}HCH_3$	−57.7 ± 8.4	1
$^{\bullet}C_3H_7O$, $CH_3CH_2OC^{\bullet}H_2$	−45.2 ± 8.4	1
$^{\bullet}C_3H_7O$, $C^{\bullet}H_2CH_2OCH_3$	−7.1 ± 4.2	1
$^{\bullet}C_4H_9O$, $(CH_3)_2CHOC^{\bullet}H_2$	−70.3 ± 7.1	1
$^{\bullet}C_4H_9O$, $CH_3CH_2OC^{\bullet}HCH_3$	−81.2 ± 4.2	1
$^{\bullet}C_4H_9O$, $C^{\bullet}H_2CH(CH_3)OCH_3$	−42.3 ± 3.8	1
$^{\bullet}C_4H_9O$, $(CH_3)_2C^{\bullet}OCH_3$	−72.4 ± 10	1
$^{\bullet}C_5H_{11}O$, $(CH_3)_3COC^{\bullet}H_2$	−102.5 ± 8.4	1
$^{\bullet}C_2H_5O_2$, $HOCH_2C^{\bullet}HOH$	−220.1 ± 8.4	1
C$^{\bullet}$H=C=O, ketenyl	177.5 ± 8.8	1
HC$^{\bullet}$(O)	42.5 ± 0.5	1
C$^{\bullet}$CO	381.2 ± 2.1	1
$CH_3C^{\bullet}(O)$	−10.3 ± 1.8	1
$CF_3C^{\bullet}(O)$	−608.7	1
$CH_2ClC^{\bullet}(O)$	−21 ± 12.6	1
$CHCl_2C^{\bullet}(O)$	−17.6 ± 23	1
$CCl_3C^{\bullet}(O)$	−19.7	1
$CH_3CH_2C^{\bullet}(O)$	−31.7 ± 3.4	1
$CH_2CHC^{\bullet}(O)$	88.5	1
$CH_2C(CH_3)C^{\bullet}(O)$	58.6 ± 16.7	1
$CH_3CH_2CH_2C^{\bullet}(O)$	54.4 ± 4.2	1
$(CH_3)_2CHC^{\bullet}(O)$	−64.0 ± 3.8	1
$(CH_3)_3CC^{\bullet}(O)$	−102.9 ± 6.3	1
$C_6H_5C^{\bullet}(O)$	116.3 ± 10.9	1
$HC(O)CH_2^{\bullet}$	10.5 ± 9.2	1
$ClC(O)CH_2^{\bullet}$	−52.7 ± 13	1
E-C$^{\bullet}$HClC(O)H	−27.2 ± 10.5	1
Z-C$^{\bullet}$HClC(O)H	−23.4 ± 10.5	1
$C^{\bullet}Cl_2C(O)H$	−55.6 ± 14.2	1
E-C$^{\bullet}$HClC(O)Cl	−88.7 ± 15.1	1
$C^{\bullet}H_2C(O)F$	−273.0 ± 5.8	1
Z-C$^{\bullet}$HClC(O)Cl	−84.9 ± 13.8	1
$C^{\bullet}Cl_2C(O)Cl$	−101.7 ± 15.5	1
$CH_3C(O)CH_2^{\bullet}$	−34 ± 3	1
$CH_3C(O)C^{\bullet}HCH_3$	−70.3 ± 7.1	1
$CH_3C(O)C^{\bullet}$=CH_2	113.4	1
$C_2H_5C(O)C^{\bullet}HCH_3$	−107.5 ± 20.9	1

Radical	$\Delta_f H°_{298}$/kJ mol^{-1}	Ref.
$iPrC(O)C^{\bullet}(CH_3)_2$	−173.6 ± 20.9	1
$tC_4H_9C(O)C^{\bullet}H_2$	−115.5 ± 12.6	1
$PhC(O)C^{\bullet}H_2$	84.5 ± 12.6	1
$PhC(O)C^{\bullet}HCH_3$	41.4 ± 20.9	1
$PhC^{\bullet}HC(O)CH_2Ph$	134.3 ± 20.9	1
$PhC(O)OC^{\bullet}H_2$	−69.9	1
$^{\bullet}C(O)OH$-trans	≥−194.6 ± 2.9	1
$^{\bullet}C(O)OH$-cis	−219.7	1
$^{\bullet}C(O)OCH_3$	−161.5	1
$C^{\bullet}H_2C(O)OH$	−248.9 ± 12.0	1
$C^{\bullet}H(CH_3)C(O)OH$	−293 ± 3	1
$C^{\bullet}H_2C(O)OCH_3$	−236.8 ± 8.4	1
$C^{\bullet}H_2C(O)OCH_2CH_3$	−260.2 ± 12.6	1
$C^{\bullet}H_2C(O)OPh$	−28.0	1
$^{\bullet}C_4H_7O$, tetrahydrofuran-2-yl	−18.0 ± 6.3	1
$^{\bullet}C_4H_8O$, cyclopentanon-2-yl	−41.8 ± 12.6	1
$^{\bullet}C_4H_7O_2$, 1,4-dioxan-2-yl	−131.8 ± 12.6	1
$^{\bullet}C_7H_5O_2$, 2-C(O)OH-$^{\bullet}C_6H_4$	−33.0	1
$^{\bullet}C_7H_5O_2$, 3-C(O)OH-$^{\bullet}C_6H_4$	−35.0	1
$^{\bullet}C_7H_5O_2$, 4-C(O)OH-$^{\bullet}C_6H_4$	−36.0	1
$^{\bullet}CH_3O_2$, $C^{\bullet}H_2OOH$	66.1	1
$^{\bullet}C_2H_5O_2$, $C^{\bullet}H_2CH_2OOH$	46.0 ± 4.6	1
$^{\bullet}C_2H_5O_2$, $CH_3CH^{\bullet}OOH$	26.9	1
$^{\bullet}C_3H_7O_2$, $CH_3CH^{\bullet}CH_2OOH$	10.9 ± 5.4	1
$^{\bullet}C_3H_7O_2$, $C^{\bullet}H_2CH(OOH)CH_3$	2.9 ± 6.3	1
$^{\bullet}C_4H_9O_2$, $(CH_3)_2C^{\bullet}CH_2OOH$	−30.1 ± 5.4	1
$^{\bullet}C_4H_9O_2$, $C^{\bullet}H_2C(CH_3)_2OOH$	−26.8 ± 5.4	1
$^{\bullet}C_2H_3O_3$, $C^{\bullet}H_2C(O)OOH$	−137.9	1
$^{\bullet}CHN_2$	494.5	1
$^{\bullet}CH_2N$=CH_2	263.6 ± 12.6	1
$^{\bullet}CH_2NH_2$	151.9 ± 8.4	1
$CH_3C^{\bullet}HNH_2$	111.7 ± 8.4	1
$(CH_3)_2C^{\bullet}NH_2$	69.9 ± 8.4	1
$^{\bullet}CH_2NHCH_3$	156.6	1
$^{\bullet}CH_2N(CH_3)_2$	148.0	1
$(C_2H_5)_2NC^{\bullet}HCH_3$	68.6 ± 2.1	1
$^{\bullet}CH_2N(CH_3)Ph$	266.0 ± 12.6	1
$^{\bullet}CN$	439.3 ± 2.9	1
$^{\bullet}CH_2CN$	252.6 ± 4	1
$CH_3C^{\bullet}HCN$	226.7 ± 12.6	1
$^{\bullet}CH_2CH_2CN$	245.4 ± 12.6	1
$(CH_3)_2C^{\bullet}CN$	190.4 ± 12.6	1
$Ph(CH_3)C^{\bullet}CN$	248.5 ± 8.4	1
$NCC^{\bullet}HCH_2CN$	381.8 ± 12.6	1
$^{\bullet}CH_2NC$	334.7 ± 16.7	1
$^{\bullet}C(O)NC$	210.0 ± 10	1
$^{\bullet}C(O)NH_2$	−15.1 ± 4	1
C$^{\bullet}$NN	569 ± 21	1
HC$^{\bullet}$NN	460 ± 8	1
$H_2C^{\bullet}NN$	292.5 ± 2.1	1
$^{\bullet}CH_2NO$	157 ± 4	1

Radical	$\Delta_f H°_{298}$/kJ mol^{-1}	Ref.
$^{\bullet}CH_2NO_2$	115.1 ± 12.6	1
$CH_3C^{\bullet}HNO_2$	61.9 ± 12.6	1
$(CH_3)_2C^{\bullet}NO_2$	6.3 ± 12.6	1
$PhC^{\bullet}HNO_2$	169.0 ± 12.6	1
$^{\bullet}C_6H_6N$, 3-NH_2-C_6H_4	320.1	1
$^{\bullet}C_6H_6N$, 4-NH_2-C_6H_4	327.8	1
$^{\bullet}C_6H_4NO_2$, 3-NO_2-C_6H_4	340.6 ± 10.0	1
$^{\bullet}C_6H_4NO_2$, 4-NO_2-C_6H_4	302.7	1
$^{\bullet}C_6H_4CH_3$, 2-Me-C_6H_4	315.1 ± 10.5	1
$^{\bullet}C_6H_4CH_3$, 4-Me-C_6H_4	296.6 ± 9.6	1
$^{\bullet}C_6H_3N_2O_4$, 3,5-$(NO_2)_2$-C_6H_3	305.4	1
$^{\bullet}C_7H_6NO_2$, 2-Me-4-NO_2-C_6H_3	295.4 ± 8.4	1
$^{\bullet}C_4H_3N$, pyrrol-2-yl	385.8	1
$^{\bullet}C_4H_3N$, pyrrol-3-yl	385.8	1
$^{\bullet}C_4H_8N$, pyrrolidin-2-yl	142.7 ± 12.6	1
$^{\bullet}C_5H_4N$, pyrid-2-yl	362.0	1
$^{\bullet}C_5H_4N$, pyrid-3-yl	391.0	1
$^{\bullet}C_5H_4N$, pyrid-4-yl	391.0	1
$^{\bullet}C_4H_7N_2$, piperad-2-yl	119.7	1
$^{\bullet}C_4H_3N_2$, pyrazin-2-yl	409.2 ± 12.6	1
$^{\bullet}C_4H_3N_2$, pyrimid-2-yl	388.0 ± 12.6	1
$^{\bullet}C_4H_3N_2$, pyrimid-4-yl	409.0 ± 12.6	1
$^{\bullet}C_4H_3N_2$, pyrimid-5-yl	446.4 ± 12.6	1
$^{\bullet}CH(NO_2)_2$	139.1	1
$^{\bullet}C(NO_2)_3$	201.2	1
$^{\bullet}CH_2C(NO_2)_3$	150.6	1
$^{\bullet}CH_2CH(NO_2)_2$	103.3	1
$^{\bullet}CH_2CH_2C(NO_2)_3$	133.9	1
$^{\bullet}CH_2N(NO_2)CH_2C(NO_2)_3$	173.6	1
$^{\bullet}CH_2N(NO_2)CH_2CH(NO_2)_2$	126.4	1
$^{\bullet}CH_2CH_2N(NO_2)CH_2C(NO_2)_3$	168.6	1
$^{\bullet}CH_2CH_2ONO_2$	37.7	1
$^{\bullet}CH_2(ONO_2)CHCH_2ONO_2$	−25.5	1
$^{\bullet}CH(CH_2ONO_2)_2$	−57.3	1
$^{\bullet}CH_2C(CH_2ONO_2)_3$	−158.2	1
$^{\bullet}CH_2NHNO_2$	164.8	1
$^{\bullet}CH_2N(NO_2)CH_3$	149.4	1
$^{\bullet}CH_2N(NO_2)_2$	210.5	1
$^{\bullet}CH_2CH_2N(NO_2)CH_3$	144.3	1
$^{\bullet}CH_2N(NO_2)CH_2N(NO_2)CH_3$	202.1	1
$^{\bullet}CH_2N(NO_2)(CH_2)N(NO_2)CH_3$	173.2	1
$C^{\bullet}(S)H$	300.4 ± 8.4	1
$^{\bullet}CH_2SH$	151.9 ± 8.4	1
$^{\bullet}CH_2SCH_3$	136.8 ± 5.9	1
$^{\bullet}CH_2SPh$	268.6 ± 12.6	1
$^{\bullet}CH_2SOCH_3$	23.8 ± 12.6	1
$HOC^{\bullet}(S)S$	110.5	1
$^{\bullet}CH_2SO_2CH_3$	−177.0 ± 12.6	1
$^{\bullet}CH_2SO_2Ph$	−57.3 ± 12.6	1
$PhC^{\bullet}HSO_2CH_3$	−109.2 ± 12.6	1
$PhC^{\bullet}HSO_2Ph$	7 ± 12.6	1
$Ph_2C^{\bullet}SO_2Ph$	102 ± 12.6	1
$Ph_2C^{\bullet}SPh$	435.6 ± 12.6	1
$NC^{\bullet}(O)$	127.2	1
$^{\bullet}CNH$	207.9 ± 12.1	1
$^{\bullet}CNO$	323 ± 30	1
$^{\bullet}CH_2SiMe_3$	−32 ± 6	1
$^{\bullet}CH_2C(CH_3)_2SiMe_3$	−125	1
$^{\bullet}CP$	450 ± 9	1
(2) **Oxygen-Centered Species**		
$HO^{\bullet}$	37.36 ± 0.13	1
$FO^{\bullet}$	109 ± 10	1
$ClO^{\bullet}$	101.63 ± 0.1	1
$BrO^{\bullet}$	126.2 ± 1.7	1
$IO^{\bullet}$	115.9 ± 5.0	1
$HOO^{\bullet}$	12.30 ± 0.25	1
$FOO^{\bullet}$	25.4 ± 2	1
$ClOO^{\bullet}$	98.0 ± 4	1
$BrOO^{\bullet}$	108 ± 40	1
$IOO^{\bullet}$	96.6 ± 15	1
$OFO^{\bullet}$	378.6 ± 20	1
$OClO^{\bullet}$	95.4	1
$ClOOClO^{\bullet}$	142 ± 12	1
$ClClO^{\bullet}$	90 ± 30	1
$NCO^{\bullet}$	184.1	1
$CNO^{\bullet}$	386.6	1
$HONNO^{\bullet}$	172	1
sym-ClO_3	217.2 ± 21	1
$HSO^{\bullet}$	−21.8 ± 2.1	1
$HSOO^{\bullet}$	112	1
$CH_3SOO^{\bullet}$	76	1
$CF_3SO_2O^{\bullet}$	−912	1
$NCO^{\bullet}$	184.0	1
$O_2NO^{\bullet}$	73.7 ± 1.4	1
$ONOO^{\bullet}$	82.8	1
$HOS(O)_2O^{\bullet}$	−511.7	1
$CH_3O^{\bullet}$	21.0 ± 2.1	1
$CF_3O^{\bullet}$	−635.1 ± 7.1	1
$CCl_3O^{\bullet}$	−38.1 ± 9.2	1
$CH_2ClO^{\bullet}$	−21.3 ± 9.2	1
$CHCl_2O^{\bullet}$	−32.2 ± 9.2	1
CH_2=CH-$O^{\bullet}$	18.4 ± 1.3	1
$CF_3CHFO^{\bullet}$	−851.0	1
$C_2H_5O^{\bullet}$	−13.6 ± 3.3	1
$CH_3CHClO^{\bullet}$	−61.9 ± 12.1	1
$CH_3CCl_2O^{\bullet}$	−91.6 ± 11.7	1
$nC_3H_7O^{\bullet}$	−30.1 ± 8.4	1
$iC_3H_7O^{\bullet}$	−48.5 ± 3.3	1
$(CH_3)_2CClO^{\bullet}$	−108.4 ± 8.4	1
$nC_4H_9O^{\bullet}$	−62.8	1
$sC_4H_9O^{\bullet}$	−69.5	1
$tC_4H_9O^{\bullet}$	−85.8 ± 3.8	1

Radical	$\Delta_f H°_{298}$/kJ mol^{-1}	Ref.
CH_2=$CHCH_2O^•$	87.0	1
$C_6H_5O^•$	48.5 ± 2.9	1
o-Cl-$C_6H_4O^•$	30.6	1
$C_6Cl_5O^•$	~63	1
p-Cl-$C_6H_4O^•$	~9	1
o-OH-$C_6H_4O^•$	−186.3	1
p-OH-$C_6H_4O^•$	−143.6	1
o-CH_3O-$C_6H_4O^•$	−125.5	1
p-CH_3O-$C_6H_4O^•$	−81.1	1
$C_6H_5CH_2O^•$	136.0 ± 12.6	1
$C_{10}H_7O^•$, naphthoxy-1	165.3	1
$C_{10}H_7O^•$, naphthoxy-2	174.1	1
$HC(O)O^•$	−129.7 ± 12.6	1
$FC(O)O^•$	368.0	1
$CH_3C(O)O^•$	−179.9 ± 12.6	1
$CF_3C(O)O^•$	−797.0	1
$CF_3OC(O)O^•$	−958.1 ± 16.7	1
$C_6H_5C(O)O^•$	−50.2 ± 16.7	1
$CH_3OO^•$	20.1 ± 5.1	1
$C_2H_3OO^•$, CH_2=$CHOO^•$	101.7 ± 1.7	1
$C_2H_5OO^•$	−28.5 ± 9.6	1
$C_3H_5OO^•$, CH_2=$CHCH_2OO^•$	88.7	1
$iC_3H_7OO^•$	−65.4 ± 11.3	1
$C_4H_7OO^•$, CH_3CH=$CHCH_2OO^•$	82.6 ± 5.3	1
$tC_4H_9OO^•$	−101.5 ± 9.2	1
neo-$C_5H_{11}OO^•$	−115.5	1
$HOCH_2OO^•$	−162.1	1
$HOOCH_2CH_2OO^•$	100	1
$C_6H_5CH_2OO^•$	114.6 ± 4.2	1
c-$C_6H_{11}OO^•$	−25.0 ± 10.5	1
$(C_2H_5)N(CH3)CHOO^•$	−36.0 ± 12.6	1
$CF_3OO^•$	−635.0	1
$CF_2ClOO^•$	−406.7 ± 14.6	1
$CFCl_2OO^•$	−213.7	1
$CH_2ClOO^•$	−5.1 ± 13.6	1
$CHCl_2OO^•$	−19.2 ± 11.2	1
$CCl_3OO^•$	−20.9 ± 8.9	1
$CH_3CHClOO^•$	−54.7 ± 3.4	1
$CH_3CCl_2OO^•$	−63.8 ± 9.8	1
$CH_3OCH_2OO^•$	−142.2 ± 4.2	1
$CH_3C(O)CH_2OO^•$	−142.1 ± 4	1
$CH_3C(O)OO^•$	−154.4 ± 5.8	1
$HOOO^•$	>12.84	4
$CH_3OOO^•$	33.4 ± 12.6	1
$C_2H_5OOO^•$	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
$^•NH_2$	186.2 ± 1.0	1
$^•NNH$	249.5	1
$^•NCO$	131.8	1
$^•N_3$	414.2 ± 20.9	1
$^•N_2H_3$	243.5	1
(Z)-N_2H_2	213.0 ± 10.9	1
NF	209.2	1
$^•NF_2$	42.3 ± 8	1
$^•NHF$	112 ± 15	1
NBr	301 ± 21	1
HNO	107.1 ± 2.5	1
FNO	−65.7 ± 1.7	1
ClNO	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
$NH_2C(O)N^•H$	0.8 ± 12.6	1
$CH_3C(O)N^•H$	−6.7 ± 12.6	1
$NH_2C(S)N^•H$	194 ± 12.6	1
$CH_3C(S)N^•H$	173 ± 12.6	1
$PhC(S)N^•H$	307 ± 12.6	1
$HCON^•H$	49.8 ± 12.6	1
$NH_2C(NH)N^•H$	250.6 ± 12.6	1
$^•NHCN$	319.2 ± 2.9	1
$CH_2N^•H$	104.6 ± 12.6	1
$CH_3N^•H$	184.1 ± 8.4	1
$tBuN^•H$	95.4 ± 12.6	1
$C_6H_5CH_2N^•H$	288.3 ± 12.6	1
$C_6H_5N^•H$	244.3 ± 4.2	1
$(CH_3)_2N^•$	158.2 ± 4.2	1
$(C_6H_5)(CH_3)N^•$	241.0 ± 6.3	1
$(C_6H_5)_2N^•$	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
$CH_3N_2^•$	215.5 ± 7.5	1
$C_2H_5N_2^•$	187.4 ± 10.5	1
$iC_3H_7N_2^•$	146.0 ± 8.4	1
$nC_4H_9N_2^•$	140.6 ± 8.4	1
$tC_4H_9N_2^•$	97.5 ± 4.2	1
$(NO_2)HN^•$	162.3	1
$(CH_3)(NO_2)N^•$	139.0	1
$(NO_2)_2N^•$	200.0	1
$CH_3N^•CH_2N(NO_2)CH_3$	185.4	1
(4) **Sulfur-Centered Species**		
$HOS^•$	−6.7 ± 2.1	1
$HC(O)S^•$	56.5	1
$HS^•O_2$	−221.8	1
$HOS^•O_2$	−384.9	1
$NCS^•$	300 ± 8	1

Radical	$\Delta_f H°_{298}$/kJ mol^{-1}	Ref.
HS$^•$	143.0 ± 0.8	1
$CH_3S^•$	124.7 ± 1.7	1
$C_2H_5S^•$	101	1
$nC_3H_7S^•$	80	1
$iC_3H_7S^•$	74.9 ± 8.4	1
$tC_4H_9S^•$	43.9 ± 8.4	1
$C_6H_5S^•$	242.7 ± 4.6	1
$C_6Cl_5S^•$	~184	1
$C_6H_5CH_2S^•$	246	1
$CH_3S^•O$	−67 ± 10	1
$CH_3S^•O_2$	−239.3	1
HSS$^•$	115.5 ± 14.6	1
$CH_3SS^•$	68.6 ± 8.4	1
$C_2H_5SS^•$	43.5 ± 8.4	1
$iC_3H_7SS^•$	13.8 ± 8.4	1
$tC_4H_9SS^•$	−19.2 ± 8.4	1
HOC(S)S$^•$	110.5 ± 4.6	1
HC(O)S$^•$	56.5	1
SF	13.0 ± 6.3	1
SF_2	−296.7 ± 16.7	1
SF_3	−503.0 ± 33.5	1
SF_4	−763.2 ± 20.9	1
SF_5	−879.9 ± 15.1	1
ClS$^•$	156.5 ± 16.7	1
SN	263.6 ± 105	1
SCl	156.5 ± 16.7	1
(5) Si-, Ge-, Sn-, Pb-Centered Species		
SiF	−20.1 ± 12.6	1
SiF_2	−638 ± 6	1
$^•SiF_3$	−987 ± 20	1
SiCl	198.3 ± 6.7	1
$SiCl_2$	−169 ± 3	1
$^•SiCl_3$	321 ± 8	6
SiBr	235 ± 46	1
$SiBr_2$	46 ± 8	1
$^•SiBr_3$	−201.7 ± 63	1
SiI	313.8 ± 42	1
SiI_2	92.5 ± 8.4	1
$^•SiI_3$	35.3 ± 63	1
SiH	376.6 ± 8.4	1
$SiH_2(^1A_1)$	273 ± 2	1
$SiH_2(^3B_1)$	360.7	1
$^•SiH_3$	200.4 ± 2.5	1
$MeSi^•H_2$	141 ± 6	1
$Me_2Si^•H$	78 ± 6	1
$Me_3Si^•$	15 ± 7	1
$^•Si_2H_3$	~402	1

Radical	$\Delta_f H°_{298}$/kJ mol^{-1}	Ref.
$H_3SiSi^•H_2$	234 ± 6	1
$C_6H_5Si^•H_2$	274	1
$H_3SiSi^•H$	312 ± 8	1
$MeSi^•$	302.2	1
$MeSi^•H$	202 ± 6	1
$Me_2Si^{••}$	135 ± 8	1
SiN	313.8 ± 42	1
$^•GeH_3$	221.8 ± 8.4	1
GeF	−71 ± 10	1
GeF_2	−574 ± 20	1
$^•GeF_3$	−807 ± 50	1
GeCl	69 ± 18	1
$GeCl_2$	−171 ± 5	1
$^•GeCl_3$	−268 ± 50	1
GeBr	137 ± 5	1
$GeBr_2$	−61 ± 5	1
$^•GeBr_3$	−119 ± 50	1
GeI	211 ± 25	1
GeI_2	50.2 ± 4	1
$^•GeI_3$	42 ± 50	1
SnF	−95 ± 7.2	1
SnF_2	−511 ± 9.2	1
$^•SnF_3$	−647 ± 50	1
SnCl	35 ± 12	1
$SnCl_2$	−202.6 ± 7.1	1
$^•SnCl_3$	−292 ± 50	1
SnBr	76 ± 12	1
$SnBr_2$	−119 ± 2.8	1
$^•SnBr_3$	−159 ± 50	1
SnI	173 ± 12	1
SnI_2	−8.1 ± 4.2	1
$^•SnI_3$	−8 ± 50	1
$^•Sn(CH_3)_3$	132.2	1
$^•Sn(C_6H_5)_3$	518.8 ± 21	1
PbH	236.2 ± 19.2	1
PbF	−80.3 ± 10.5	1
PbF_2	−435.1 ± 8.4	1
$^•PbF_3$	−490 ± 60	1
PbCl	15.1 ± 50	1
$PbCl_2$	−174.1 ± 1.3	1
$^•PbCl_3$	−178 ± 80	1
PbBr	70.9 ± 42	1
$PbBr_2$	−104.4 ± 6.3	1
$^•PbBr_3$	−104 ± 80	1
PbI	107.4 ± 37.7	1
PbI_2	−3.2 ± 4.2	1
$^•PbI_3$	22 ± 80	1

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TABLE 5. Bond Dissociation Energies of Some Organic Molecules

D^0_{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_2H_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_3H_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_4H_9	400.4	495.8	351.9	292.9	227.2	398.3	353.1	355.6	167	363.6	329.3	—	—
C_6H_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
$C_6H_5CH_2$	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_2F_5	429.7	532.2	346.0	283.3	219.2	—	—	—	—	—	—	424.3	—
CH_3CO	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_6F_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

$$D^o_{298}(A^+–B) \equiv \Delta_f H^o(A^+) + \Delta_f H^o(B) - \Delta_f H^o(AB^+) = D^o_{298}(A–B) + IP(A) - IP(AB)$$

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

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

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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^2_{98}/kJ mol^{-1}	Ref.
(1) Group 1		
Li$^+$–H_2	27.2	1
Li$^+$–CO	57 ± 13	1
Li$^+$–H_2O	139 ± 8	1
Li$^+$–NH_3	156 ± 8	1
Li$^+$–CH_4	130	1
Li$^+$–CH_3OH	156 ± 8	1
Li$^+$–CH_3OCH_3	167 ± 10	1
Li$^+$–pyridine	183.0 ± 14.5	1
Li$^+$–Gly (glycine)	220 ± 9	1
Na$^+$–H_2	10.4 ± 0.8	1
Na$^+$–N_2	33.5	1
Na$^+$–CO	31 ± 8	1
Na$^+$–CO_2	66.5	1
Na$^+$–SO_2	79.1	1
Na$^+$–O_3	52.3	1
Na$^+$–H_2O	91.2 ± 6.3	1
Na$^+$(H$_2$O)–H_2O	82.0 ± 5.8	1
Na$^+$(H$_2$O)$_2$–H_2O	66.1	1
Na$^+$(H$_2$O)$_3$–H_2O	52.7 ± 0.8	1
Na$^+$(glycine)–H_2O	75.1 ± 5.3	1
Na$^+$(glutamine)–H_2O	52 ± 1	1
Na$^+$–NH_3	106.2 ± 5.4	1
Na$^+$–HNO_3	86.2	1
Na$^+$–CH_4	30.1	1
Na$^+$–CH_3OH	98.8 ± 5.7	1
Na$^+$–CH_3CN	125.5 ± 9.6	1
Na$^+$–C_2H_4	44.6 ± 4.4	1
Na$^+$–CH_3OCH_3	101.4 ± 5.7	1
Na$^+$–$CH_3C(O)H$	114.4 ± 3.4	1
Na$^+$– MeCOMe	131.3 ± 4.1	1
Na$^+$–C_6H_6	97.0 ± 5.9	1
Na$^+$–pyrrole	103.7 ± 4.8	1
Na$^+$–Gly (glycine)	166.7 ± 5.1	1
Na$^+$–Ala (alanine)	167 ± 4	1
Na$^+$–GlyGly (glycylglycine)	203 ± 8	1
K$^+$–H_2	6.1 ± 0.8	1
K$^+$–CO_2	35.6	1
K$^+$–H_2O	74.9	1
K$^+$(H$_2$O)$_2$–H_2O	67.4	1
K$^+$(H$_2$O)$_3$–H_2O	55.2	1
K$^+$(H$_2$O)$_4$–H_2O	11.8	1
K$^+$(H$_2$O)$_5$–H_2O	44.8	1
K$^+$(H$_2$O)$_6$–H_2O	41.8	1
K$^+$–NH_3	79 ± 7	1
K$^+$–C_6H_6	80.3	1
K$^+$–adenine	95.1 ± 3.2	1
K$^+$–indole	104.6 ± 12.6	1
K$^+$–Phe (phenylalanine)	150.5 ± 5.8	1
K$^+$–Tyr (tyrosine)	165.0 ± 5.8	1
Rb$^+$–H_2O	66.9 ± 12.6	1
Rb$^+$–NH_3	78.2	1
Rb$^+$–CH_3CN	86.6 ± 1.3	1
Rb$^+$–C_6H_5OH	70.2 ± 3.7	1
Cs$^+$–H_2O	57.3	1
Cs$^+$–$C_6H_5NH_2$	70.8 ± 4.5	1
(2) Group 2		
CH$_3$Be$^+$–CH_3	192.9 ± 13.4	1
tert-**C(CH$_3$)$_3$Be$^+$**–*tert*-$C(CH_3)_3$	121.8 ± 13.4	1
Mg$^+$–OH	314 ± 33	1
Mg$^+$–CO	43.1 ± 5.8	1
Mg$^+$–CO_2	58.4 ± 5.8	1
Mg$^+$–H_2O	122.5 ± 12.5	1
Mg$^+$–NH_3	158.9 ± 11.6	1
Mg$^+$–CH_4	29.8 ± 6.8	1
Mg$^+$–MeOH	147.6 ± 6.8	1
Mg$^+$–C_6H_6	155.2	1
Mg$^+$–pyridine	200.0 ± 6.4	1
Mg$^+$–imidazole	243.9 ± 10.4	1
Mg^{2+}(H$_2$O)$_5$–H_2O	101.3	1
Mg^{2+}(Me$_2$CO)$_5$–Me_2CO	93.3	1
Ca$^+$–OH	435.1 ± 14.5	1
Ca$^+$–H_2O	117.2	1
Ca$^+$–C_6H_6	134	1
Ca$^+$–imidazole	186.3 ± 3.9	1
Ca^{2+}(H$_2$O)$_4$–H_2O	110.0 ± 5.9	1
Ca^{2+}(Me$_2$CO)$_5$–Me_2CO	101.3	1
Sr$^+$–CO	20.3	1
Sr$^+$–CO_2	41.9	1
Sr$^+$–H_2O	144.3	1
Sr$^+$–C_6H_6	117	1
Sr^{2+}(H$_2$O)$_5$–H_2O	87.4	1
Ba$^+$–OH	530.7 ± 19.3	1
Ba^{2+}(H$_2$O)$_4$–H_2O	90.8	1
(3) Group 3		
Sc$^+$–H_2	23.0 ± 1.3	1
Sc$^+$–CH_2	412 ± 22	1
Sc$^+$–CH_3	233 ± 10	1
Sc$^+$–C_2H_2	240 ± 20	1
Sc$^+$–C_2H_4	≥131	1
Sc$^+$–C_6H_6	222 ± 21	1
Sc$^+$–H_2O	131	1

Bond	Do^2_{98}/kJ mol^{-1}	Ref.
Sc$^+$–NH	483 ± 10	1
Sc$^+$–NH_2	347 ± 5	1
Sc$^+$–pyridine	231.5 ± 10.3	1
Y$^+$–CH_2	398 ± 13	1
Y$^+$–CH_3	249 ± 5.0	1
Y$^+$–C_2H_2	218 ± 13	1
Y$^+$–C_2H_4	>138	1
Y$^+$–CO	29.9 ± 10.6	1
Y$^+$–CS	137.0 ± 7.7	1
Y$^+$**(O)**–CO_2	86 ± 5	1
La$^+$–CH	523 ± 33	1
La$^+$–CH_2	401 ± 7	1
La$^+$–CH_3	217 ± 15	1
La$^+$–C_2H_2	262 ± 30	1
La$^+$–C_2H_4	192.5	1
Lu$^+$–CH_2	>230 ± 6	1
Lu$^+$–CH_3	176 ± 20	1
U$^+$**(F)**–F	552 ± 44	1
U$^+$**(F)**$_2$–F	523 ± 38	1
U$^+$**(F)**$_3$–F	381 ± 19	1
U$^+$**(F)**$_4$–F	243 ± 17	1
U$^+$**(F)**$_5$–F	26 ± 11	1
(4) Group 4		
Ti$^+$–CH	478 ± 5	1
Ti$^+$–CH_2	391 ± 15	1
Ti$^+$–CH_3	213.8 ± 3	1
Ti$^+$–CH_4	70.3 ± 2.5	1
Ti$^+$–C_2H_2	213 ± 13	1
Ti$^+$–C_2H_4	146 ± 11	1
Ti$^+$–C_6H_6	259 ± 9	1
Ti$^+$–CO	117.7 ± 5.8	1
Ti$^+$–H_2O	157.7 ± 5.9	1
Ti$^+$–NH	466 ± 12	1
Ti$^+$–NH_2	356 ± 13	1
Ti$^+$–NH_3	197 ± 7	1
Ti$^+$–pyridine	217.2 ± 9.3	1
Ti$^+$–imidazole	≤232.4 ± 8.2	1
Zr$^+$–CH	568 ± 13	1
Zr$^+$–CH_2	444.8 ± 5	1
Zr$^+$–CH_3	227.7 ± 9.6	1
Zr$^+$–C_2H_2	273 ± 14	1
Zr$^+$–CO	77 ± 10	1
Zr$^+$–CS	257.6 ± 10.6	1
Hf$^+$–CH	492.1 ± 14.5	2
Hf$^+$–CH_2	421.6 ± 6.8	2
Hf$^+$–CH_2	204.5 ± 25.1	2
Hf$^+$–C_2H_2	150.6	1
(5) Group 5		
(CO)$_6$**V**$^+$–H	220 ± 14	1
V$^+$–H_2	42.7 ± 2.1	1
V$^+$–CH	470 ± 5	1
V$^+$–CH_2	326 ± 6	1
V$^+$–CH_3	193 ± 7	1
V$^+$–C_2H_2	172 ± 8	1
V$^+$–C_2H_4	124 ± 8	1
V$^+$–(η^5-C_5H_5)	530.7	1
V$^+$–C_6H_6	234 ± 10	1
V$^+$–CO	114.8 ± 2.9	1
V$^+$–CO_2	72.4 ± 3.8	1
V$^+$–H_2O	149.8 ± 5.0	1
V$^+$–NH	423 ± 29	1
V$^+$–NH_2	293 ± 6	1
V$^+$–NH_3	192 ± 11	1
V$^+$–pyridine	218.7 ± 13.5	1
V$^+$–imidazole	≤243.4 ± 8.0	1
Nb$^+$–H_2	61.9	1
Nb$^+$–CH	581 ± 19	1
Nb$^+$–CH_2	428.4 ± 8.7	1
Nb$^+$–CH_3	198.8 ± 10.6	1
Nb$^+$–CH_3NH_2	134	1
Nb$^+$–C_3H_6	117.7	1
(NbFe)$^+$–C_3H_4	>163	1
Nb$^+$–CO	95.5 ± 4.8	1
Nb$^+$–CS	242.2 ± 10.6	1
Nb$_7^+$–N_2	<215	1
Ta$^+$–CH	561.5 ± 15.4	6
Ta$^+$–CH_2	464.1 ± 2.9	6
Ta$^+$–CH_3	259.5 ± 13.5	6
Ta$^+$–C_6H_6	251~301	1
(6) Group 6		
(CO)$_6$**Cr**$^+$–H	230 ± 10	1
(η^5-**C**$_5$**H**$_5$)**(NO)(CO)**$_2$**Cr**$^+$–H	207.1 ± 14	1
Cr$^+$–H_2	31.8 ± 2.1	1
Cr$^+$–CH	294 ± 29	1
Cr$^+$–CH_2	216 ± 4	1
Cr$^+$–CH_3	110 ± 4	1
Cr$^+$–C_6H_6	170 ± 10	1
Cr$^+$–indole	196.6 ± 16.7	1
Cr$^+$–CO	89.7 ± 5.8	1
Cr$^+$–OH	298 ± 14	1
Cr$^+$–H_2O	132.6 ± 8.8	1
Cr$^+$–N_2	59 ± 4	1
Cr$^+$–NH_3	183 ± 10	1
(CO)$_6$**Mo**$^+$–H	260 ± 9	1
Mo$^+$–CH	513.3 ± 13.5	1
Mo$^+$–CH_2	344.4 ± 10	1
Mo$^+$–CH_3	151.5 ± 8.7	1
Mo$^+$–CO	193.9 ± 9.6	1
Mo$^+$–CO_2	49.2 ± 7	1
Mo$^+$–CS	162 ± 18	1
Mo$^+$–CS_2	67.5 ± 12.5	1

Bond	Do^2_{98}/kJ mol^{-1}	Ref.
Mo$^+$–NH	<385	1
Mo$^+$–pyrrole	>289	1
(CO)$_6$W$^+$–H	257 ± 9	1
W$^+$–CH	580 ± 27	1
W$^+$–CH$_2$	456.4 ± 5.8	1
W$^+$–CH$_3$	~222.9 ± 9.6	1
(PMe$_3$)$_3$(CO)$_3$W$^+$–H	259.4	1
W$^+$–pyrrole	>209	1
(7) Group 7		
(CO)$_5$Mn$^+$–H	172 ± 10	1
Mn$^+$–H$_2$	7.9 ± 1.7	1
Mn$^+$–CH$_2$	295 ± 13	1
Mn$^+$–CH$_3$	215 ± 10	1
Mn$^+$**(CO)$_5$**–CH$_3$	132 ± 15	1
Mn$^+$**(CO)$_5$**–CH$_4$	>30	1
Mn$^+$–(η^5-C$_5$H$_5$)	326.1 ± 9.6	1
Mn$^+$–C$_6$H$_6$	145 ± 10	1
Mn$^+$–OH	332 ± 24	1
Mn$^+$–CO	25 ± 10	1
Mn$^+$–H$_2$O	121.8 ± 5.9	1
Mn$^+$–CH$_3$OH	134 ± 29	1
Mn$^+$–OC(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
Tc$^+$–C$_2$H$_2$	<320	1
Re$^+$**(CH$_3$)(CO)$_5$**–H	294 ± 13	1
(PMe$_3$)(CO)$_2$Re$^+$–H	300.4	1
(8) Group 8		
Fe$^+$**(O)**–H	444 ± 17	1
Fe$^+$**(CO)**–H	120 ± 23	1
Fe$^+$**(H$_2$O)**–H	215 ± 14	1
Fe$^+$**(η^5-C$_5$H$_5$)**–H	193 ± 21	1
(CO$_2$)$_5$Fe$^+$–H	299 ± 15	1
Fe$^+$–H$_2$	45.2 ± 2.5	1
Fe$^+$–CH	423 ± 29	1
Fe$^+$–CH$_2$	≤342 ± 2	1
Fe$^+$–CH$_3$	229 ± 5	1
Fe$^+$–CH$_4$	73.2	1
Fe$^+$–C$_2$H$_2$	159.0 ± 2.1	1
Fe$^+$–C$_2$H$_3$	238 ± 10	1
Fe$^+$–C$_2$H$_4$	145 ± 11	1
Fe$^+$–C$_2$H$_5$	233 ± 9	1
Fe$^+$–C$_2$H$_6$	64 ± 6	1
Fe$^+$–OH	366 ± 12	1
Fe$^+$–CO	129.3 ± 3.9	1
Fe$^+$**D**–CO	53 ± 13	1
Fe$^+$–CO$_2$	74.3 ± 7.7	1
Fe$^+$–H$_2$O	128.9 ± 0.8	1
Fe$^+$–N$_2$	53 ± 4	1
Fe$^+$–NH$_3$	184 ± 12	1
Fe$^+$–CS$_2$	166.1 ± 4.6	1
Fe$^+$–imidazole	246.1 ± 13.8	1
Fe$^+$–SiH	254 ± 13	1
Fe$^+$–SiH$_2$	181 ± 9	1
Fe$^+$–SiH$_3$	183 ± 9	1
Ru$^+$**(η^5-C$_5$H$_5$)$_2$**–H	292 ± 16	1
(η^5-C$_5$Me$_5$)$_2$Ru$^+$–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		
(η^5-C$_5$H$_5$)(CO)$_2$Co$^+$–H	245 ± 12	1
(CH$_3$OD)Co$^+$–H	147.6 ± 7.7	1
Co$^+$–H$_2$	76.1 ± 4.2	1
(η^5-C$_5$H$_5$)Co$^+$–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
Co$^+$–C$_{60}$	243 ± 67	1
Co$^+$–CO	173.7 ± 6.7	1
Co$^+$–H$_2$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
Co$^+$–CH$_3$CN	>255 ± 17	1
Co$^+$–P(CH$_3$)$_3$	278 ± 11	1
Co$^+$–P(C$_2$H$_5$)$_3$	339 ± 16	1
(CH)Rh$^+$–H	372 ± 21	1
(η^5-C$_5$H$_5$)(CO)$_2$Rh$^+$–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
(CO)(η^5-C$_5$H$_5$)(PPh$_3$)Ir$^+$–H	313.4	1
(CO)$_2$(η^5-C$_5$Me$_5$)Ir$^+$–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
Ir$^+$–C$_2$H$_4$	234.3	1
(10) Group 10		
(CO)$_4$Ni$^+$–H	248 ± 9	1
(η^5-C$_5$H$_5$)(NO)Ni$^+$–H	315 ± 14	1
(η^5-C$_5$H$_5$)(η^5-C$_5$H$_5$)Ni$^+$–H	215 ± 13	1

Bond	Do^2_{98}/kJ mol^{-1}	Ref.
Ni$^+$–H_2	72.4 ± 1.3	1
Ni$^+$–CH	301.0 ± 11.6	1
Ni$^+$–CH_2	306 ± 4	1
Ni$^+$–CH_3	169.8 ± 6.8	1
Ni$^+$–CH_4	96.5 ± 4	1
Ni$^+$–OH	235 ± 19	1
Ni$^+$–CO	175 ± 11	1
Ni$^+$–CO_2	104 ± 1	1
Ni$^+$–H_2O	183.7 ± 3.3	1
Ni$^+$–CS	234.5 ± 9.6	1
Ni$^+$–N_2	110.9 ± 10.5	1
Ni$^+$–NO	227.6 ± 7.5	1
Ni$^+$–NH_2	232.5 ± 7.7	1
Ni$^+$–NH_3	238 ± 19	1
Pd$^+$–CH	536 ± 10	1
Pd$^+$–CH_2	463 ± 3	1
Pd$^+$–CH_3	258 ± 8	1
Pd$^+$–CH_4	170.8 ± 7.7	1
Pd$^+$–CS	200 ± 14	1
Pd$^+$–C_2H_2	>28.9 ± 4.8	1
Pt$^+$–H_2	146.7 ± 11.6	1
Pt$^+$–CH	536.4 ± 9.6	1
Pt$^+$–CH_2	471	1
Pt$^+$–CH_3	257.6 ± 7.7	1
Pt$^+$–CH_4	170.8 ± 7.7	1
Pt$^+$–O_2	64.6 ± 4.8	1
Pt$^+$–CO	218.1 ± 8.7	1
Pt$^+$–CO_2	59.8 ± 4.8	1
Pt$^+$–NH_3	274 ± 12	1
Pt$^+$–C_2H_4	229.7	1
(11) Group 11		
Cu$^+$–H_2	51.9 ± 0.4	1
Cu$^+$–CH_2	267.3 ± 6.8	1
Cu$^+$–CH_3	111 ± 7	1
Cu$^+$–C_2H_2	>21.2 ± 9.6	1
Cu$^+$–C_2H_4	176 ± 14	1
Cu$^+$–C_6H_6	218.0 ± 9.6	1
Cu$^+$–CO	149 ± 7	1
Cu$^+$–N_2	89 ± 30	1
Cu$^+$–NO	109.0 ± 4.8	1
Cu$^+$–H_2O	160.7 ± 7.5	1
Cu$^+$–NH_2	192 ± 13	1
Cu$^+$–NH_3	237 ± 15	1
Cu$^+$–CS	238.3 ± 11.6	1
Cu$^+$–SiH	246 ± 27	1
Cu$^+$–SiH_2	≥231 ± 7	1
Cu$^+$–SiH_3	97 ± 25	1
Ag$^+$–CH_2	≥107 ± 4	1
Ag$^+$–CH_3	66.6 ± 4.8	1
Ag$^+$–C_2H_5	65.7 ± 7.5	1
Ag$^+$–C_6H_6	167 ± 19	1
Ag$^+$–O_2	29.7 ± 0.8	1
Ag$^+$–CO	89 ± 5	1
Ag$^+$–H_2O	134 ± 8	1
Ag$^+$–CS	152 ± 20	1
Ag$^+$–NH_3	170 ± 13	1
Au$^+$–CH_2	357.0 ± 6.8	5
Au$^+$–CH_3	209.4 ± 23.2	5
Au$^+$–C_2H_4	344.5	1
Au$^+$–C_6H_6	289 ± 29	1
Au$^+$–CO	201 ± 8	1
Au$^+$–H_2O	164.0 ± 9.6	1
Au$^+$–H_2S	230 ± 25	1
Au$^+$–NH_3	297 ± 29	1
Au$^+$–PH_3	402 ± 33	1
(12) Group 12		
Zn$^+$–H_2	15.7 ± 1.7	1
Zn$^+$–CH_3	280 ± 7	1
Zn$^+$–OH	127.2	1
Zn$^+$–H_2O	163	1
Zn$^+$–NO	76.2 ± 9.6	1
Zn$^+$–pyrimidine	209.6 ± 7.7	1
Zn$^+$–CS	149 ± 23	1
Cd$^+$–CH_3	228 ± 3	1
Cd$^+$**(**CH_3**)**–CH_3	109 ± 3	1
Cd$^+$–C_6H_6	136 ± 19	1
Hg$^+$–CH_3	285 ± 3	1
Hg$^+$**(**CH_3**)**–CH_3	96 ± 3	1
(13) Group 13		
B$^+$–H_2	15.9 ± 0.8	1
HB$^+$–H_2	61.5 ± 2.1	1
(CH_3**)**$_2$**B**$^+$–CH_3	32.6 ± 4.2	1
Al$^+$–H_2	5.6 ± 0.6	1
Al$^+$–N_2	5.6	1
Al$^+$–CO_2	≥29.3	1
Al$^+$–H_2O	104 ± 15	1
Al$^+$–MeOH	139.7	1
Al$^+$–EtC(O)Et	191.2	1
Al$^+$–C_6H_6	147.3 ± 8.4	1
Al$^+$–pyridine	190.3 ± 10.3	1
Al$^+$–phenol	154.8 ± 16.7	1
Al$^+$–imidazole	232.4 ± 8.2	1
Ga$^+$–NH_3	122.5	1
In$^+$–NH_3	111.0	1
(14) Group 14		
C_{58}^+–C_2	955 ± 15	1
C_{60}^+–C_2	822.0 ± 12.5	1
C_{62}^+–C_2	846.2 ± 10.6	1
C_{78}^+–C_2	938.8 ± 10.6	1
HC_2^+–H	574.749	1
$C_6H_5^+$–H	376.3 ± 4.8	1

Bond	Do^2_{98}/kJ mol^{-1}	Ref.
$\mathbf{C_2H_3^+}$–Cl	249 ± 1.0	7
$\mathbf{C_2H_5^+}$–Br	206.3 ± 1.0	7
$\mathbf{C_6H_5^+}$–Br	266.3	1
$C_2H_3^+$–I	196.2 ± 1.4	7
$\mathbf{CH_3^+}$–H_2	186	1
$\mathbf{CH_5^+}$–H_2	7.9 ± 0.4	1
$\mathbf{C_2H_5^+}$–H_2	17	1
$\mathbf{CH_3^+}$–O_2	80 ± 7	4
$\mathbf{CO^+}$–N_2	67.5 ± 19.3	1
$\mathbf{H_2CH^+}$–N_2	31.8	1
$\mathbf{CO^+}$–CO	173.7 ± 14.6	1
$\mathbf{CO^+(CO)}$–CO	52.3	1
$\mathbf{CO^+(CO)_2}$–CO	30.2	1
$\mathbf{CO^+(CO)_3}$–CO	18.4	1
$\mathbf{(CO_2)^+}$–CO_2	70.3	1
$\mathbf{(CO_2)^+(CO_2)}$–CO_2	34.7	1
$\mathbf{(CO_2)^+(CO_2)_2}$–$CO_2$	21.3	1
$\mathbf{(CO_2)^+(CO_2)_3}$–$CO_2$	20.1 ± 1.3	1
$\mathbf{CH_3^+}$–N_2O	221.3	1
$\mathbf{CH_3^+}$–SO_2	253.6	1
$\mathbf{CH_3^+}$–OCS	239.3	1
$\mathbf{CH_3^+}$–CS_2	251.9	1
$\mathbf{CH_3^+}$–H_2O	279	1
$\mathbf{CH_3^+(H_2O)}$–H_2O	106.3	1
$\mathbf{CH_3^+(H_2O)_2}$–H_2O	87.9	1
$\mathbf{CH_3^+(H_2O)_3}$–H_2O	61.9	1
$\mathbf{CH_3^+(H_2O)_4}$–H_2O	48.5	1
$\mathbf{CH_3^+}$–H_2S	344.8	1
$\mathbf{CH_2^+}$–CH_2O	303.0 ± 2.9	1
$\mathbf{CH_3^+}$–NH_3	431.4	1
$\mathbf{(CH_3)^+}$–CH_3	209.2 ± 4.2	1
$\mathbf{CH_3^+}$–CH_4	166.5	1
$\mathbf{CF_3^+}$–CH_4	19.0	1
$\mathbf{(CH_5)^+}$–CH_4	28.7 ± 1.3	1
$\mathbf{C_6H_6^+}$–CH_4	12.0	1
$\mathbf{CH_3^+}$–CH_3F	230	1
$\mathbf{CH_3^+}$–CF_3Cl	221	1
$\mathbf{CH_3^+}$–CH_3Cl	259	1
***tert*-$\mathbf{C_4H_9^+}$**–CH_3OH	63	1
***tert*-$\mathbf{C_4H_9^+}$**–CH_3CN	85	1
***tert*-$\mathbf{C_4H_9^+}$**–SO_2F_2	43.5	1
$\mathbf{CH_3^+}$–C_2H_3O	338.7 ± 2.9	1
$\mathbf{CH_3^+}$–CF_3ClOCl	252	1
***tert*--$\mathbf{C_4H_9^+}$**–$(CH_3)_2S$	185	1
***tert*-$\mathbf{C_4H_9^+}$**–C_2H_5OH	85	1
***tert*-$\mathbf{C_4H_9^+}$**–C_3H_8	27.6	1
***tert*-$\mathbf{C_4H_9^+}$**–t-C_4H_9Cl	339	1
tert-$\mathbf{C_4H_9^+}$–$(CH_3)_3CH$	30.1	1
tert-$\mathbf{C_4H_9^+}$–C_6H_6	92	1
$\mathbf{(C_6H_6)^+}$–C_6H_6	73.6	1
$\mathbf{(C_6H_6)^+}$–indole	54.8	1
$\mathbf{C_6F_6^+}$–C_6F_6	30.1 ± 4	1
$\mathbf{C_{60}^+}$–C_{60}	35.89 ± 7.72	1
$\mathbf{PhSiH_2^+}$–H	159	1
$\mathbf{Si^+(CH_3)_3}$–Cl	178.5 ± 1.9	1
$\mathbf{SiH_3^+}$–CO	≥151	1
$\mathbf{SiF_3^+}$–CO	174.1 ± 1.3	1
$\mathbf{(CH_3)_3Si^+}$–H_2O	125.9 ± 7.9	1
$\mathbf{(CH_3)_3Si^+}$–NH_3	194.6	1
$\mathbf{Si^+(CH_3)(Cl)_2}$–$CH_3$	60.8 ± 2.9	1
$\mathbf{Si^+(CH_3)_2(Cl)}$–$CH_3$	41.5 ± 1.9	1
$\mathbf{Si^+}$–CH_3	413.9 ± 5.8	1
$\mathbf{Si^+(CH_3)}$–CH_3	123 ± 48	1
$\mathbf{Si^+(CH_3)_2}$–CH_3	513 ± 27	1
$\mathbf{Si^+(CH_3)_3}$–CH_3	66.6 ± 5.8	1
$\mathbf{(CH_3)_3Si^+}$–CH_3OH	164.0	1
$\mathbf{(CH_3)_3Si^+}$–$(C_2H_5)_2O$	184.9	1
$\mathbf{(CH_3)_3Si^+}$–C_6H_6	100.0	1
$\mathbf{(CH_3)_3Si^+}$–CH_3NH_2	231.8	1
$\mathbf{(CH_3)_3Ge^+}$–H_2O	119.7 ± 2.1	1
$\mathbf{(C_2H_5)_3Ge^+}$–H_2O	104.2 ± 2.1	1
$\mathbf{(CH_3)_3Sn^+}$–NH_3	154	1
$\mathbf{(CH_3)_3Sn^+}$–H_2O	108	1
$\mathbf{(CH_3)_3Sn^+}$–$(CH_3)_2CO$	157	1
$\mathbf{(CH_3)_3Sn^+}$–C_3H_7SH	143	1
$\mathbf{Pb^+}$–H_2O	93.7	1
$\mathbf{Pb^+}$–NH_3	118.4 ± 0.8	1
$\mathbf{Pb^+}$–CH_3OH	97.5 ± 0.8	1
$\mathbf{Pb^+}$–CH_3NH_2	148.1 ± 1.3	1
$\mathbf{Pb^+}$–C_6H_6	110 ± 2	1
(15) Group 15		
$\mathbf{H_2N^+}$–H	544.43 ± 0.10	1
$\mathbf{H_3N^+}$–H	515.1	1
$\mathbf{Me_3N^+}$–H	376	1
$\mathbf{Et_3N^+}$–H	362	1
(imidazole)$^+$ –Zn	216.1 ± 3.9	1
$\mathbf{N_2H^+}$–H_2	24.7 ± 0.8	1
$\mathbf{ON^+}$–O_2	14.2	1
$\mathbf{N^+}$–N_2	303.8	1
$\mathbf{ON^+}$–N_2	21.3	1
$\mathbf{N_2^+}$–N_2	102.3 ± 14.6	1
$\mathbf{HN_2^+}$–N_2	60.7	1
$\mathbf{N_3^+}$–N_2	18.8 ± 1.3	1
$\mathbf{O_2N^+}$–N_2	19.2 ± 1.3	1
$\mathbf{H_4N^+}$–N_2	54 ± 21	1
$\mathbf{ON^+}$–NO	59.4 ± 0.8	1
$\mathbf{ON^+}$–CO	27.2 ± 1.3	1
$\mathbf{ON^+}$–O_3	<58	1
$\mathbf{ON^+}$–CO_2	32.2	1
$\mathbf{N_2O^+}$–ON_2	72.8 ± 6.3	1
$\mathbf{NO^+}$–ON_2	36.4 ± 0.8	1
$\mathbf{(HON_2)^+}$–ON_2	69.9 ± 4	1

Bond	Do^2_{98}/kJ mol^{-1}	Ref.
ON^+–H_2O	95	1
$ON^+(H_2O)$–H_2O	67.4	1
$ON^+(H_2O)_2$–H_2O	56.5	1
H_4N^+–H_2O	86.2 ± 4.2	1
$H_4N^+(H_2O)$–H_2O	72.8 ± 4.2	1
$H_4N^+(H_2O)_2$–H_2O	57.3 ± 4.2	1
$H_4N^+(H_2O)_3$–H_2O	51.0	1
$H_4N^+(H_2O)_4$–H_2O	44.4	1
(glycine)H$^+$–H_2O	77.2 ± 11.0	1
(tryptophan)H$^+$–H_2O	31.2 ± 2.5	1
(tryptophanylglicine)H$^+$–H_2O	56.0 ± 5.3	1
H_4N^+–H_2S	47.7	1
$H^+(NH_3)$–NH_3	108.8	1
$H^+(NH_3)_2$–NH_3	69.5	1
$H^+(NH_3)_3$–NH_3	57.3	1
$H^+(NH_3)_4$–NH_3	49.0	1
$H^+(NH_3)_5$–NH_3	29.3	1
$H^+(NH_3)_6$–NH_3	27.2	1
NH_4^+–CH_4	15.0	1
ON^+–CH_3OH	97.6	1
O_2N^+–CH_3OH	80.3 ± 9.6	1
(CH$_3$CNH)$^+$–CH_3CN	130.1 ± 9.6	1
(pyridineH)$^+$–pyridine	105.4 ± 4	1
(valine H)$^+$–valine	86.6 ± 8.4	1
(betainH)$^+$–betaine	139.9 ± 4.8	1
H_4P^+–H_2O	54.4	1
$(H_4P)^+$–PH_3	48.1	1
AsH_2^+–H	257	1
I_2As^+–acetone	106 ± 17	1
I_2As^+–benzene	77 ± 17	1
Bi^+–H_2O	95.4	1
Bi^+–NH_3	149	1
Bi^+–C_6H_6	≤149	1
(16) Group 16		
$(H_3O)^+$–H_2	14.6 ± 2.1	1
O^+–O_2	179.5	1
$O^+(O_2)_1$–O_2	28.9	1
$O^+(O_2)_2$–O_2	3.9	1
O_2^+–O_2	38.3 ± 2.1	1
$O_2^+(O_2)$–O_2	24.6 ± 1.3	1
$O_2^+(O_2)_2$–O_2	10.4 ± 0.8	1
$O_2^+(O_2)_3$–O_2	9.0 ± 0.8	1
$O_2^+(O_2)_4$–O_2	8.0 ± 0.8	1
$O_2^+(O_2)_5$–O_2	7.9 ± 1.3	1
O^+–N_2	231.4	1
O_2^+–N_2	22.6	1
$(H_3O)^+$–N_2	22.2 ± 2.1	1
O_4^+–N_2	12.3	1
O_2^+–CO	31.8	1
O_2^+–CO_2	41.0 ± 2.1	1
CO_2^+–CO_2	65.3 ± 4	1
$(H_3O)^+$–CO_2	64.0	1
$(H_3O)^+(CO_2)$–CO_2	51.9	1
$(H_3O)^+(CO_2)_2$–CO_2	43.9	1
$(H_3O)^+(CO_2)_3$–CO_2	18.0	1
O_2^+–ON_2	56.1 ± 4	1
$(H_3O)^+$–ON_2	70.7 ± 6.5	1
$(H_3O)^+(H_2O)$–ON_2	50.6 ± 2.1	1
$(H_3O)^+(H_2O)_2$–ON_2	42.7 ± 2.1	1
O_3^+–O_3	67.5 ± 39	1
$OClO^+$–OClO	246 ± 48	1
O_2^+–H_2O	>67	1
$(OH)^+(H_2O)_2$–H_2O	87.4	1
$(OH)^+(H_2SO_4)(H_2O)_4$–H_2O	56.9	1
$(OH)^+(H_2SO_4)(H_2O)_5$–H_2O	49.8	1
$(OH)^+(H_2SO_4)(H_2O)_6$–H_2O	44.8	1
$(H_2O)^+$–H_2O	164.0	1
$(H_3O)^+$–H_2O	140.2	1
$(H_3O)^+(H_2O)$–H_2O	93.3	1
$(H_3O)^+(H_2O)_2$–H_2O	71.1	1
$(H_3O)^+(H_2O)_3$–H_2O	64.0	1
$(H_3O)^+(H_2O)_4$–H_2O	54.4	1
$(H_3O)^+(H_2O)_5$–H_2O	49.0	1
$(H_3O)^+(H_2O)_6$–H_2O	43.1	1
(HCOOH)H$^+$–H_2O	100.8	1
$CH_3OH_2^+$–H_2O	115.6	1
CH_3CHOH^+–H_2O	104.6	1
$(CH_3)_2OH^+$–H_2O	100.4	1
(tetrahydrofuranH)$^+$–H_2O	82.8	1
(furanH)$^+$–H_2O	43.5	1
furane$^+$–H_2O	41.0	1
(phenol)$^+$–H_2O	78.0	1
(1-naphthol)$^+$–H_2O	66.4	1
H_3O^+–HC(O)H	137.7	1
H_3O^+–NH_3	229.3	1
$H_3O^+(NH_3)$–NH_3	77.0	1
$H_3O^+(NH_3)_2$–NH_3	71.5	1
$H_3O^+(NH_3)_3$–NH_3	62.8	1
H_3O^+–PH_3	144	1
H_3O^+–SO_3	74	1
(HCOOH)$^+$–HCOOH	96.5 ± 9.6	1
H_3O^+–CH_4	33.5	1
$(CH_3OH)^+$–CH_3OH	115.8 ± 19.3	1
$CH_3OH_2^+$–CH_3OH	136.4	1
H_3O^+–CH_3CN	195.4	1
furan$^+$–furan	94.1	1
BH$^+$–B, B = tetrahydofuran	125.1	1
S^+–CS_2	166	1
CS^+–CS_2	150.6	1
CS_2^+–CS_2	104.2	1
HCS_2^+–CS_2	46.4	1
OS^+–SO_2	57.7	1

Bond	Do^2_{98}/kJ mol^{-1}	Ref.
O_2S^+–SO_2	63.6	1
OCS$^+$–OCS	100.0	1
OCS$^+$–CO_2	72.0	1
SO_2^+–CO_2	42.7	1
H_3S^+–H_2O	91.6	1
thiopheneH$^+$–H_2O	42.7	1
H_3S^+–H_2S	53.6 ± 6.3	1
H_3S^+–CH_4	16.3	1
$(CH_3)_2Se^{\bullet+}$–$Se(CH_3)_2$	~95 ± 3	1
$(CH_3)_2Te^{\bullet+}$–$Te(CH_3)_2$	97 ± 2	1
(17) Group 17		
HF$^+$–HF	≥138	1
$(H_2Cl)^+$ –Cl	39.6	1
HCl$^+$–HCl	83.9	1
Cl$^+$–CCl_3	446.7 ± 9.6	1
Cl$^+$–C_2H_3	685.0 ± 4.8	1
HBr$^+$–HBr	96	1
I$^+$–CH_3	330.0	1
$I^+(CH_3I)$–CH_3	51.1	1
$I^+(CH_3I)_2$–CH_3	112.9	1
(18) Group 18		
$He^+(He)_1$–He	17.6	1
$He^+(He)_2$–He	2.7 ± 0.6	1
$Ne^+(Ne)$–Ne	10.3 ± 0.6	1
$Ne^+(Ne)_2$–Ne	3.3 ± 0.6	1
$Ar^+(Ar)$–Ar	20.4 ± 0.6	1
$Ar^+(Ar)_2$–Ar	7.0 ± 0.6	1
$Ar^+(N_2)$–Ar	25.1	1
$Ar^+(N_2)(Ar)$–Ar	7.1	1
$Ar^+(N_2)(Ar)_2$–Ar	7.1	1
$Kr^+(Kr)$–Kr	23.3 ± 0.6	1
$Kr^+(Kr)_2$–Kr	9.0 ± 0.6	1
$Xe^+(Xe)$–Xe	25.2 ± 0.6	1
$Xe^+(Xe)_2$–Xe	11.0 ± 0.6	1
Ar^+–H_2	93.7	1
Ar^+–N_2	127.6	1
$Ar^+(N_2)$–N_2	31.0	1
$Ar^+(N_2)_2$–N_2	10.9	1
Ar^+–CO	75 ± 17	1
$Ar^+(CO)$–CO	13	1
Kr^+–CO	103.3 ± 7.5	1
Kr^+–CO_2	79.1 ± 2.9	1

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