

Selected Bond Energies and Bond Lengths

Arranged according to families. Energy (D) in kJ/mol. Bond length (r) in picometers.

Group 5

(N, P, As, Sb, Bi)

Bond	D (kJ/mol)	r (pm)
N-N	167	145
N=N	418	125
N≡N	942	110
N-O	201	140
N=O	607	121
N-F	283	136
N-Cl	313	175
P-P	201	221
P-O	335	163
P=O	544	150
P=S	335	186
P-F	490	154
P-Cl	326	203
P-Br	264	
P-I	184	
As-As	146	243
As-O	301	178
As-F	484	171
As-Cl	322	216
As-Br	458	233
As-I	200	254
Sb-Sb	121	
Sb-F	440	

Hydrogen Compounds

Bond	D (kJ/mol)	r (pm)
H-H	432	74
H-B	389	119
H-C	411	109
H-Si	318	148
H-Ge	288	153
H-Sn	251	170
H-N	386	101
H-P	322	144
H-As	247	152
H-O	459	96
H-S	363	134
H-Se	276	146
H-T	238	170
H-F	565	92
H-Cl	428	127
H-Br	362	141
H-I	295	161

Group 4

Carbon

Bond	D (kJ/mol)	r (pm)
C-C	346	154
C=C	602	134
C≡C	835	120
C-Si	318	185
C-Ge	238	195
C-Sn	192	216
C-Pb	130	230
C-N	305	147
C=N	615	129
C≡N	887	116
C-P	264	184
C-O	358	143
C=O	799	120
C≡O	1072	113
C-B	356	
C-S	272	182
C=S	573	160
C-F	485	135
C-Cl	327	177
C-Br	285	194
C-I	213	214

Sb-Cl (SbCl ₅)	248	
Sb-Cl (SbCl ₃)	315	232

Group 4

Si, Ge, Pb

Bond	<i>D</i> (kJ/mol)	<i>r</i> (pm)
Si-Si	222	233
Si-N	355	
Si-O	452	163
Si-S	293	200
Si-F	565	160
Si-Cl	381	202
Si-Br	310	215
Si-I	234	243
Ge-Ge	188	241
Ge-N	257	
Ge-F	470	168
Ge-Cl	349	210
Ge-Br	276	230
Ge-I	212	
Sn-F	414	
Sn-Cl	323	233
Sn-Br	273	250
Sn-I	205	270
Pb-F	331	
Pb-Cl	243	242

Group 3

Boron

Bond	<i>D</i> (kJ/mol)	<i>r</i> (pm)
B-B	293	
B-O	536	
B-F	613	
B-Cl	456	175
B-Br	377	

Group 6

O, S, Se

Bond	<i>D</i> (kJ/mol)	<i>r</i> (pm)
O-O	142	148
O=O	494	121
O-F	190	142
S=O	522	143
S-S (S ₈)	226	205
S=S	425	149
S-F	284	156
S-Cl	255	207
Se-Se	172	

Group 7

F, Cl, Br, I, At

Bond	<i>D</i> (kJ/mol)	<i>r</i> (pm)
F-F	155	142
Cl-Cl	240	199
Br-Br	190	228
I-I	148	267
At-At	116	
I-O	201	
I-F	273	191
I-Cl	208	232
I-Br	175	

Source:

http://wulfenite.fandm.edu/Data%20Table_6.html

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Huheey, pps. A-21 to A-34; T.L. Cottrell, "The Strengths of Chemical Bonds," 2nd ed., Butterworths, London, 1958; B. deB. Darwent, "National Standard Reference Data Series," National Bureau of Standards, No. 31, Washington, DC, 1970; S.W. Benson, J. Chem. Educ., 42, 502 (1965).

Pb-Br	201		Se=Se	272	215
Pb-I	142	279			

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