

6.8: Bond Enthalpy and Length

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Average Bond Enthalpy (Scroll down for average bond length.)

In kJ/mol

	I	Br	Cl	S	P	Si	F	O	N	C	H
H	299	366	431	347	322	323	566	467	391	416	436
C	213	285	327	272	264	301	485	358	285	346	
N	-	-	193	-	~200	335	272	201	160		
O	201	-	205	-	~340	368	190	146			
F	-	238	255	326	490	582	158				
Si	234	310	391	226	-	226					
P	184	264	319	-	209						
S	-	213	255	226		Multiple Bonds			Multiple Bonds		
Cl	209	217	242			N=N		418	C=C		598
Br	180	193				N≡N		946	C≡C		813
I	151					C=N		616	C=O in CO ₂		803
						C≡N		866	C=O carbonyl		695
						N=O		607	C≡O		1073
						O=O in O ₂		498	N=O		632

Data from Cotton, F.A., Wilkinson, G. and Gaus, P.L., Basic Inorganic Chemistry, 3rd ed., New York: Wiley, 1995.

Corrected values for C-C, and C-O from Cottrell, T.L., The Strengths of Chemical Bonds, 2ed., London: Butterworths, 1958.

Average Bond Length

In picometers, (pm)

	I	Br	Cl	S	P	Si	F	O	N	C	H
H	161	142	127	132	138	145	92	94	98	110	74
C	210	191	176	181	187	194	141	143	147	154	
N	203	184	169	174	180	187	134	136	140		
O	199	180	165	170	176	183	130	148			
F	197	178	163	168	174	181	128				
Si	250	231	216	221	227	234					
P	243	224	209	214	220						
S	237	218	203	208		Multiple Bonds			Multiple Bonds		
Cl	232	213	200			N=N		120	C=C		134

Br	247	228				N≡N	110	C≡C	121
I	266					C=N	127	C=O in CO ₂	116
						C≡N	115	C=O carbonyl	121
						N=O	115	C≡O	113
						O=O in O ₂	121	N≡O	115

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