

FOR VARIOUS TYPES OF BONDS

Bond Dissociation Energies^{a,d}—Single Bonds: Diatomic Molecules

Bond	Energy	Bond	Energy	Bond	Energy
H—H	104.2 [436.0]	F—Cl	61 [255]	H—F	135.8 ^e [568]
D—D	106.0 [444.5]	F—Br	60 [251]	H—Cl	103.0 ^e [431]
F—F	38 [159]	F—I	58 [243]	H—Br	87.5 ^e [366]
Cl—Cl	58 [243]	Cl—Br	52 [218]	H—I	71.3 ^e [298]
Br—Br	46.0 [192]	Cl—I	50 [209]		
I—I	36.1 [151]				

Polyatomic Molecules

Bond	Energy	Bond	Energy
H—CH ₃	104 [435]	CH ₃ CH ₂ —CHCH ₂	89 [372]
H—CH ₂ CH ₃	98 [410]	CH ₃ CH ₂ —C ₆ H ₅	90 [377]
H—CHCH ₂	103 [431]	CH ₂ CH—CHCH ₂	100 [418]
H—C ₆ H ₅	103 [431]	HCC—CCH	150 [628]
H—CCH ₃	~125 [523]	C ₆ H ₅ —C ₆ H ₅	100 [418]
H—CH ₂ C ₆ H ₅	85 [356]	CH ₂ CH—C ₆ H ₅	99 [414]
H—CH ₂ CHCH ₂	85 [356]	CH ₃ —COCH ₃	82 [343]
H—CH ₂ OH	93 [389]	CH ₃ CH ₂ —COCH ₃	79 [331]
H—CF ₃	104 [435]	CH ₃ —CN	122 [510]
H—CCl	96 [401]	CH ₂ CH—COCH ₃	89 [372]
H—COCH ₃	87.5 [366]	CH ₂ CH—CN	128 [536]
H—CN	130 [543]	CH ₃ CO—COCH ₃	83 [347]
F—CH ₃	108 [451]	NC—CN	144 [602]
Cl—CH ₃	83.5 [349]	CF ₃ —CF ₃	97 [406]
Br—CH ₃	70 [293]	H—OH	119 [498]
I—CH ₃	56 [234]	H—O ₂ H	90 [377]
F—CH ₂ CH ₃	106 [443]	H—SH	90 [377]
Cl—CH ₂ CH ₃	81.5 [341]	H—OCH ₃	102 [427]
Br—CH ₂ CH ₃	69 [289]	H—OC ₆ H ₅	85 [356]
I—CH ₂ CH ₃	53.5 [224]	H—O ₂ CCH ₃	112 [469]
Cl—CHCH ₂	84 [351]	HO—CH ₃	91.5 [383]
F—C ₆ H ₅	116 [485]	HO—CH ₂ CH ₃	91.5 [383]
Br—C ₆ H ₅	72 [301]	HO—C ₆ H ₅	103 [431]
I—C ₆ H ₅	65 [272]	HO—COCH ₃	109 [456]
F—CF ₃	129 [540]		
Cl—CF ₃	85 [356]	CH ₃ O—CH ₃	80 [335]
Br—CF ₃	70 [293]	CH ₃ O—CH ₂ CH ₃	80 [335]
I—CF ₃	54 [226]	CH ₃ O—CHCH ₂	81 [339]
F—CCl ₃	106 [444]	CH ₃ O—C ₆ H ₅	91 [381]
Cl—CCl ₃	73 [305]	CH ₃ O—COCH ₃	97 [406]
Br—CCl ₃	54 [226]		
F—COCH ₃	119 [791]	HO—OH	51 [213]
Cl—COCH ₃	83.5 [349]	HO—Br	57 [238]
I—COCH ₃	52.5 [220]	CH ₃ O—OCH ₃	36 [151]
CH ₃ —CH ₃	88 [368]	H ₂ N—H	103 [431]
CH ₃ —CH ₂ CH ₃	85 [356]	H ₂ N—CH ₃	79 [331]
CH ₃ —CH ₂ OH	83 [347]		

Bond	Energy	Bond	Energy
CH ₃ —CF ₃	100 [418]	H ₂ N—CH ₂ CH ₃	78 [396]
CH ₃ —CHCH ₂	92 [385]	H ₂ N—C ₆ H ₅	91 [381]
CH ₃ —C ₆ H ₅	93 [389]	H ₂ N—COCH ₃	~96 [401]
CH ₂ —CCH	117 [490]	O ₂ N—NO ₂	13.6 [57]
CH ₃ —CH ₂ C ₆ H ₅	72 [301]	O ₂ N—COCH ₃	97 [406]
CH ₃ —CH ₂ CHCH ₂	72 [301]		

Multiple Bonds

Bond	Energy	Bond	Energy
O=O	119 [498]	CF ₂ =CF ₂	76.3 [319]
O=CO	128 [536]	CH ₂ =NH	~154 [644]
O=CH ₂	175 [732]	C≡O	257 [1075]
O=NH	115 [481]	N≡N	226 [946]
HN=NH	~109 [456]	N≡CH	224 [937]
CH ₂ =CH ₂	163 [682]	HC≡CH	230 [962]

Representative Average Bond Energies^d—Single Bonds

	C	N	O	F	Cl	Br	I	Si
H	100 [418]	93 [389]	110 [460]	136 [569]	103 [431]	88 [368]	71 [297]	72 [301]
C	81 [339]	69 [289]	84 [351]	105 [439]	79 [331]	67 [280]	57 [238]	69 [289]
N		38 [159]	43 [180]	65 [272]	48 [201]			
O			33 [138]	50 [209]	50 [209]			
F					60 [251]			
Cl						53 [222]		
Br							57 [238]	
I								60 [251]
Si							43 [180]	50 [209]
								45 [188]

Multiple Bonds

Elements	Single bond	Double bond	Triple bond
O—O	33 [138]	96 [402]	
N—N	38 [159]	100 [418]	226 [946]
C—C	81 [339]	148 [619]	194 [812]
C—O	84 [351]	172 [720]	
C—N	69 [289]	148 [619]	213 [891]

^aFrom Gordon, A. J.; Ford, R. A. "The Chemists Companion"; Wiley: New York, 1972. Reprinted by permission of John Wiley & Sons. Copyright 1972 John Wiley & Sons, Inc.
^bIn kcal mol⁻¹. Numbers in brackets are values in kJ mol⁻¹.
^cBenson, S. W. *J. Chem. Educ.* 1965, 42, 502. Reprinted by permission of the Division of Chemical Education.
^dFrom Wasser, J.; Trueblood, K. N.; Knobler, C. M. "Chem One"; McGraw-Hill: New York, 1976. Adapted by permission of McGraw-Hill.