

## Standard Bond Energies

| Single Bonds | $\Delta H^\circ^*$ | Single Bonds | $\Delta H^\circ^*$ | Multiple Bonds           | $\Delta H^\circ^*$ |
|--------------|--------------------|--------------|--------------------|--------------------------|--------------------|
| H-H          | 104.2              | B-F          | 150                | C=C                      | 146                |
| C-C          | 83                 | B-O          | 125                | N=N                      | 109                |
| N-N          | 38.4               | C-N          | 73                 | O=O                      | 119                |
| O-O          | 35                 | N-CO         | 86                 | C=N                      | 147                |
| F-F          | 36.6               | C-O          | 85.5               | C=O (CO <sub>2</sub> )   | 192                |
| Si-Si        | 52                 | O-CO         | 110                | C=O (aldehyde)           | 177                |
| P-P          | 50                 | C-S          | 65                 | C=O (ketone)             | 178                |
| S-S          | 54                 | C-F          | 116                | C=O (ester)              | 179                |
| Cl-Cl        | 58                 | C-Cl         | 81                 | C=O (amide)              | 179                |
| Br-Br        | 46                 | C-Br         | 68                 | C=O (halide)             | 177                |
| I-I          | 36.                | C-I          | 51                 | C=S (CS <sub>2</sub> )   | 138                |
| H-C          | 99                 | C-B          | 90                 | N=O (HONO)               | 143                |
| H-N          | 93                 | C-Si         | 76                 | P=O (POCl <sub>3</sub> ) | 110                |
| H-O          | 111                | C-P          | 70                 | P=S (PSCl <sub>3</sub> ) | 70                 |
| H-F          | 135                | N-O          | 55                 | S=O (SO <sub>2</sub> )   | 128                |
| H-Cl         | 103                | S-O          | 87                 | S=O (DMSO)               | 93                 |
| H-Br         | 87.5               | Si-F         | 135                | P=P                      | 84                 |
| H-I          | 71                 | Si-Cl        | 90                 | P≡P                      | 117                |
| H-B          | 90                 | Si-O         | 110                | C≡O                      | 258                |
| H-S          | 81                 | P-Cl         | 79                 | C≡C                      | 200                |
| H-Si         | 75                 | P-Br         | 65                 | N≡N                      | 226                |
| H-P          | 77                 | P-O          | 90                 | C≡N                      | 213                |

\* Average Bond Dissociation Enthalpies in kcal per mole  
(There can be considerable variability in some of these values.)

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