

| formation<br>$\Delta_f H$ (inorganic)                            | /kJmol <sup>-1</sup> | formation<br>$\Delta_f H$ (organic)                | /kJmol <sup>-1</sup> | combustion<br>$\Delta_c H$                  | /kJmol <sup>-1</sup> |
|--|----------------------|--|----------------------|---|----------------------|
| Na <sub>2</sub> CO <sub>3</sub>                                  | -1130.7              | CH <sub>4</sub>                                    | -74.8                | C <sub>(graphite)</sub>                     | -394                 |
| Na <sub>2</sub> CO <sub>3</sub> •10H <sub>2</sub> O              | -4081.3              | C <sub>2</sub> H <sub>6</sub>                      | -84.7                | CO  | -283                 |
| NaHCO <sub>3</sub>   | -950.8               | C <sub>3</sub> H <sub>8</sub>                      | -104.5               | H <sub>2</sub>                              | -286                 |
| CaCO <sub>3</sub>  | -1206.9              | C <sub>4</sub> H <sub>10</sub>                     | -125.6               | CH <sub>4</sub>                             | -890                 |
| CaO  | -635.1               | C <sub>2</sub> H <sub>4</sub>                      | +52.2                | C <sub>2</sub> H <sub>6</sub>               | -1560                |
| CO   | -110.5               | C <sub>3</sub> H <sub>6</sub>                      | +20.2                | C <sub>3</sub> H <sub>8</sub>               | -2219                |
| CO <sub>2</sub>  | -394                 | CH <sub>3</sub> OH                                 | -251.3               | C <sub>4</sub> H <sub>10</sub>              | -2877                |
| H <sub>2</sub> O <sub>(l)</sub>                                  | -286                 | C <sub>2</sub> H <sub>5</sub> OH                   | -277.6               | C <sub>2</sub> H <sub>4</sub>               | -1410.8              |
| Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>                    | -1123                | C <sub>3</sub> H <sub>7</sub> OH (1°)              | -303.0               | C <sub>3</sub> H <sub>6</sub>               | -2058.1              |
| Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> •5H <sub>2</sub> O | -2608                | C <sub>4</sub> H <sub>9</sub> OH (1°)              | -327.6               | CH <sub>3</sub> OH                          | -726.0               |
| NaCl   | -411                 | CH <sub>3</sub> COOH                               | -484.5               | C <sub>2</sub> H <sub>5</sub> OH            | -1367                |
| NaBr   | -361                 | CH <sub>3</sub> COOCH <sub>2</sub> CH <sub>3</sub> | -479.3               | C <sub>3</sub> H <sub>7</sub> OH (1°)       | -2021.0              |
| Na <sub>2</sub> O  | -414                 |  |                      |   |                      |
| KF   | -563                 |  |                      |   |                      |
| MgCl <sub>2</sub>  | -642                 |  |                      |   |                      |
| MgO  | -601.2               |  |                      |   |                      |
| NH <sub>3</sub>  | -46.1                |  |                      |   |                      |
| atomisation<br>$\Delta_{at} H$ (metals)                          | /kJmol <sup>-1</sup> | Mean bond enthalpy                                 | /kJmol <sup>-1</sup> | Bond Dissociation Enthalpy<br>$\Delta_d H$  | /kJmol <sup>-1</sup> |
| Li   | +159.4               | C-C  | +347                 | F-F   | +158                 |
| Na   | +107.3               | C=C  | +612                 | Cl-Cl                                       | +243.4               |
| K  | +89.2                | C-H  | +413                 | Br-Br                                       | +192.9               |
| Rb   | +80.9                | C-O  | +358                 | I-I   | +149                 |
| Cs   | +79                  | C=O (aldehydes)                                    | +736                 | H-H   | +436                 |
| Mg   | +146                 | C=O (ketones)                                      | +749                 | O-O   | +146                 |
| Ca   | +178                 | C=O (CO <sub>2</sub> )                             | +805                 | O=O   | +498                 |
|  |                      | C-N  | +286                 | N≡N   | +945                 |
|  |                      | O-H  | +464                 | C≡O   | +1072                |
| atomisation<br>$\Delta_{at} H$ (non-metals)                      | /kJmol <sup>-1</sup> | O-H (H <sub>2</sub> O)                             | +459                 | Enthalpy of Fusion                          | /kJmol <sup>-1</sup> |
| F <sub>2</sub>   | +79.0                | C-Cl   | +346                 | H <sub>2</sub> O (s) Ice                    | +6.02                |
| Cl <sub>2</sub>  | +121                 | C-Br   | +290                 |   |                      |
| Br <sub>2</sub>  | +111.9               | C-I  | +228                 | Enthalpy of Vaporization                    | /kJmol <sup>-1</sup> |
| O <sub>2</sub>   | +249.2               | N-H  | +391                 | $\Delta_{vap} H$                            |                      |
| C <sub>(graphite)</sub>  | +716.7               | N-N  | +170                 | H <sub>2</sub> O (l) Liquid Water           | +40.7                |
|  |                      |  |                      | Br <sub>2</sub> (l)                         | +30.9                |
| 1st Ionization Energies $\Delta_{IE1} H$                         | /kJmol <sup>-1</sup> | 2nd Ionization Energies $\Delta_{IE2} H$           | /kJmol <sup>-1</sup> | 1st Electron affinities<br>$\Delta_{EA1} H$ | /kJmol <sup>-1</sup> |
| Li   | +420                 | Li   | +7298                | F   | -328.0               |
| Na   | +496                 | Na   | +4563                | Cl  | -346                 |
| K  | +419                 | K  | +3051                | Br  | -324.6               |
| Rb   | +403                 | Rb   | +2632                | O   | -141                 |
| Cs   | +376                 | Cs   | +2420                | O <sup>-</sup> (∓2 <sup>nd</sup> e.a. of O) | +844                 |
| Mg   | +738                 | Mg   | +1451                | S   | -200                 |
| Ca   | +590                 | Mg <sup>+</sup> (∓3 <sup>rd</sup> IE of Mg)        | +7733                | S <sup>-</sup> (∓2 <sup>nd</sup> e.a. of S) | +649                 |
|  |                      | Ca   | +1145                |   |                      |
| Lattice Enthalpy<br>$\Delta_{LE} H$                              | /kJmol <sup>-1</sup> | solution<br>$\Delta_{soln} H$                      | /kJmol <sup>-1</sup> | hydration<br>$\Delta_{hyd} H$               | /kJmol <sup>-1</sup> |
| LiF  | -1031                | LiCl   | -37.0                | Li <sup>+</sup>                             | -520                 |
| NaF  | -918                 | NaF  | +71                  | Na <sup>+</sup>                             | -406                 |
| NaCl   | -787                 | NaCl   | +3.88                | K <sup>+</sup>                              | -322                 |
| NaBr   | -751                 | NaBr   | -1.0                 | Ag <sup>+</sup>                             | -473                 |
| KCl  | -711                 | NaI  | -7.5                 | Mg <sup>2+</sup>                            | -1921                |
| KBr  | -679                 | KF   | -17.7                | Ca <sup>2+</sup>                            | -1650                |
| MgCl <sub>2</sub>  | -2526                | KCl  | +26                  | Al <sup>3+</sup>                            | -4665                |
| CaCl <sub>2</sub>  | -2258                | NaOH   | -44.5                |   |                      |
| Na <sub>2</sub> O  | -2478                | KOH  | -57.6                | F <sup>-</sup>                              | -506                 |
| BeO  | -4443                | NH <sub>4</sub> NO <sub>3</sub>                    | +25                  | Cl <sup>-</sup>                             | -378                 |
| MgO  | -3791                | NH <sub>4</sub> Cl                                 | +17                  | Br <sup>-</sup>                             | -336                 |
| CaO  | -3454                |  |                      | O <sup>2-</sup>                             | -937                 |
| AgCl   | -890                 |  |                      |   |                      |
| NH <sub>4</sub> NO <sub>3</sub>                                  | -646                 |  |                      | NH <sub>4</sub> <sup>+</sup>                | -307                 |
| CdI <sub>2</sub>   | -2435                |  |                      | NO <sub>3</sub> <sup>-</sup>                | -314                 |
| CdI <sub>2</sub> (theoretical)                                   | -1986                |  |                      |   |                      |
| AgCl (theoretical)   | -769                 |  |                      |   |                      |
| NaCl (theoretical)   | -777                 |  |                      |   |                      |
| KBr (theoretical)  | -667                 |  |                      |   |                      |
| MgCl (theoretical)   | -753                 |  |                      |   |                      |
| MgCl <sub>3</sub> (theoretical)                                  | -5440                |  |                      |   |                      |