

## Tables

**Table 1 Units with special names and symbols<sup>1</sup>**

ALL VALUES DECIMAL

| Unit Category |   | Dimension                | The Universal Unit Systems                       |   |                                   |                              |
|---------------|---|--------------------------|--|---|-----------------------------------|------------------------------|
|               |   |                          | with the Rydberg constant(u)                     |   | Harmonic System (h)               |                              |
| Coherent      | base units that are not natural units       | length                   | m <sub>u</sub>                                   | 272.102883 mm   | m <sub>h</sub> or hm <sup>2</sup> | 272.352206 mm                |
|               |   | time                     | s <sub>u</sub>                                   | 390.267520 ms   | s <sub>h</sub> or nc              | 390.625115 ms                |
|               |   | energy                   | J <sub>u</sub>                                   | 64.143274 mJ  | J <sub>h</sub>                    | 64.084555 mJ                 |
|               |   | temperature <sup>3</sup> | K <sub>u</sub>                                   | 58.441061 μK  | K <sub>h</sub>                    | 58.387561 μK                 |
|               | base units that are natural units           | plane angle              | rad  | (2/π) arc sin(1)  |                                   |                              |
|               |   | logarithm                | neper  | log(e)  |                                   |                              |
|               |   | amount of substance      | mol <sub>n</sub> or N <sub>A</sub> <sup>-1</sup> | mol / 6.022140857 × 10. <sup>23</sup> .   |                                   |                              |
|               |   | impedance                | Ω <sub>n</sub> , Z <sub>p</sub> or nh            | 29.9792458 Ω (=1sr/(ε <sub>0</sub> c <sub>0</sub> ) strict <sup>4</sup> , is called ‘nohm’) |                                   |                              |
|               | derived units of electromagnetic quantities | charge                   | C <sub>u</sub>                                   | 28.896578 mC  |                                   |                              |
|               |   | electric current         | A <sub>u</sub>                                   | 74.043000 mA  | A <sub>h</sub>                    | 73.975218 mA                 |
|               |   | field strength           | E <sub>u</sub> <sup>5</sup>                      | 272.113986 mA/m   | E <sub>h</sub>                    | 271.616004 mA/m              |
|               |   | flux density             | G <sub>u</sub> <sup>5</sup>                      | 390.283444 mC/m <sup>2</sup>  | G <sub>h</sub>                    | 389.569207 mC/m <sup>2</sup> |
|               | derived units of dynamical quantities       | mass                     | g <sub>u</sub>                                   | 131.950080 g  | g <sub>h</sub> or ℓℓ              | 131.829287 g                 |
|               |   | power                    | W <sub>u</sub>                                   | 164.357194 mW   | W <sub>h</sub>                    | 164.056412 mW                |
|               |   | force                    | N <sub>u</sub>                                   | 235.731697 mN   | N <sub>h</sub>                    | 235.300297 mN                |

<sup>1</sup> Please see also <http://www.asahi-net.or.jp/~dd6t-sg/univunit-e/units.pdf> and <http://z13.invisionfree.com/DozensOnline/index.php?showtopic=371&st=6> for details. A web-based unit converter is available at <http://hosi.org:8080/cgi-bin/conv.cgi>.

<sup>2</sup> ‘harmon(hm)’, ‘nic(nc)’, ‘looloh(ℓℓ)’, and ‘nohm(nh)’ constitutes a quartet. These are the alias for common use.

<sup>3</sup> The unit of thermodynamic temperature has been changed. The new unit is one-1,0000;<sup>th</sup> of the old unit in the paper <http://dozenal.com> along with the introduction of the Earth local extension.

<sup>4</sup> If we adopt the elementary charge as one of the definition constants, Ω<sub>u</sub> is used in substitution for Ω<sub>n</sub>.

<sup>5</sup> The unit symbol E(Ørsted) and G(Gauß) are associated with the units of CGS unit system. In this paper, we adopt the metric unit names named after the scientists' name as it is. However, an alternative proposal to replace them with the names of the goddesses with the same initials have (i.e., Joule→Juno, Watt→Walküre, Newton→Nereide, Pascal→Polymnia, Coulomb→Clio, Ampere→Aoide, Ørsted→Erato, Gauß→Gaea, Kelvin→Korē) also been proposed.

|              |                         |  |                |  |       |             |
|--------------|-------------------------|--|----------------|--|-------|-------------|
|              |                         | Pressure                               | $P_u$          | 3.183843 Pa  | $P_h$ | 3.172201 Pa |
| Non-coherent | defining constants      | wave number                            | $R_\infty$     | 10,973,731.568508/m ( is called ‘Rydberg’)   |       |             |
|              |                         | velocity                               | $c_0$          | 299,792,458 m/s (defined, and is called ‘light’)   |       |             |
|              |                         | action                                 | $\hbar$        | $1.054571800 \times 10^{-34} \text{ J s}$ ( is called ‘quantum’)   |       |             |
|              |                         | heat capacity                          | $k_B$          | $1.38064852 \times 10^{-23} \text{ J/K}$ ( is called ‘Boltzmann’)  |       |             |
| Non-coherent | supplementary constants | the total solid angle of a hypersphere | $\Omega_k$     | $\frac{2\pi^{\frac{k+1}{2}}}{\Gamma(\frac{k+1}{2})} \text{ rad}^k$ $k=0,1,2$<br>$\Omega_0=2$<br>$\Omega_1=2\pi \text{ rad}$ (circle, cycle)<br>$\Omega_2=4\pi \text{ sr}$ (sphere, turn) |       |             |
|              |                         | logarithm of an integer                | $f_k$          | $\log(2^k)$ $k=1(\text{bit}), d(\text{figure}), 4(\text{nibble}), 8(\text{byte}), \dots$<br>$d=\log_2(12.)$  |       |             |
|              |                         | amount of substance                    | $\text{mol}_u$ | 132.007618 mol ( $=12^{.24}/N_A$ )   |       |             |
|              |                         | elementary charge                      | $e$            | $1.6021766208 \times 10^{-19} \text{ C}$<br>$(=\sqrt{\frac{\alpha \hbar}{\Omega_n}})$  |       |             |

**Table 2 Physical, material and astronomical constants<sup>6</sup>**

ALL VALUES DOZENAL

| Constant Symbols and Name<br>(UNDERLINE INDICATES CONSTANT<br>MAINTAINS SAME VALUE BETWEEN<br>SYSTEMS u AND h) |                                     | Constant Value expressed by<br>the Universal Unit Systems |                        | Exponent $N$<br>of $10^N$ | Unit<br>Symbol<br>(u and h<br>suffixes<br>omitted) |
|--|-------------------------------------|---|------------------------|---------------------------|--|
|  |                                     | with the<br>Rydberg<br>constant (u)                       | Harmonic<br>System (h) |                           |  |
| $R_\infty$   | Rydberg constant                    | 1   | 1;00170000             | 6;                        | $\Omega_1/\text{m}$                                |
| $c_0$  | <u>the speed of light in vacuum</u> | 1   |                        | 8;                        | m/s  |
| $\hbar$  | <u>quantum of action</u>            | 1   |                        | -26;                      | J s  |
| $k_B$  | <u>Boltzmann constant</u>           | 1   |                        | -20;                      | J/K  |
| $N_A$  | <u>Avogadro constant</u>            | 1   |                        | 20;                       | $\text{mol}^{-1}$                                  |
| $R$  | <u>gas constant</u>                 | 1   |                        | 0;                        | J/(mol K)  |
| $u$  | unified atomic mass unit            | 1;0009061   | 1;0024073              | -20;                      | $\text{g}^{-7}$                                    |
| $a_B$  | Bohr Radius                         | 1;005E85686   | 1;00447X740            | -9;                       | m  |
| $\alpha$   | <u>fine structure constant</u>      | 1;07399405  |                        | -2;                       | -  |
| $e$  | <u>elementary charge</u>            | 1;0374439E  |                        | -14;                      | C  |
| $m_e$  | electron mass                       | 0;E469222   | 0;E48324X              | -23;                      | g  |

<sup>6</sup> If CODATA (2014) values are required, see <http://physics.nist.gov/cuu/Constants/index.html> .

<sup>7</sup> Because  $g_u$  is approximately  $100^{.10}$ ;  $u$ , I add alias name ‘looloh’ (lú:lou/əu) to  $g_h$ .

|            |  |              |                                   |      |                                     |
|------------|--|--------------|-----------------------------------|------|-------------------------------------|
| $\sigma$   | <u>Stefan-Boltzmann constant</u>                       | 1;E82E28     |                                   | -1E; | W/(m <sup>2</sup> K <sup>4</sup> )  |
| $m_G$      | gravitic meter ( $\sqrt{2E}; l_P$ )                    | 1;0018       | 1;0001                            | -27; | m                                   |
| $l_P$      | Planck length  | 2;0445       | 2;0413                            | -28; | m                                   |
| $F_P$      | Planck force ( $\hbar c_0 / l_P^2$ )                   | 2;XE23       | 2;XEE5( $\div 2;E$ ) <sup>8</sup> | 35;  | N                                   |
| $G$        | Newtonian constant of gravitation ( $c_0^4 / F_P$ )    | 4;1574       | 4;1463                            | -X;  | (m <sup>4</sup> /s <sup>4</sup> )/N |
| $\theta_W$ | <u>weak mixing angle</u>                               | E;304        |                                   | -2;  | $\Omega_1$                          |
| $V_m$      | molar volume of an ideal gas under standard conditions | 1;02X468     | 1;025664                          | 2;   | m <sup>3</sup> /mol                 |
|            | black-body radiation at the ice point                  | 0;EX2462     | 0;EX8780                          | 2;   | W/m <sup>2</sup>                    |
|            | maximum density of water                               | 1;088184     | 1;092X47 ( $\div 15;14;$ )        | 2;   | g/m <sup>3</sup>                    |
|            | density of ice at the ice point                        | 0;E7E9       | 0;E85E                            | 2;   | g/m <sup>3</sup>                    |
|            | specific heat of water <sup>9</sup>                    | 0;6052       | 0;6045 ( $\div 1/2$ )             | 0;   | J/(g K)                             |
|            | surface tension of water at 25°C                       | 0;EE68       | 0;EEE4                            | -1;  | N/m                                 |
| atm        | standard atmosphere                                    | 1;65008E     | 1;659967 ( $\div 1;66$ )          | 4;   | P                                   |
| $g_n$      | standard gravitational acceleration                    | 5;5X54XE9    | 5;5E21264 ( $\div E;2$ )          | 0;   | m/s <sup>2</sup>                    |
| $r_E$      | gravitational radius of Earth                          | 2;41E8982X13 | 2;4180306534                      | -2;  | m                                   |
| au         | astronomical unit                                      | 8;X67575537  | 8;X55509X33                       | X;   | m                                   |
|            | <u>astronomical unit</u>                               | 9;E91731X53  |                                   | -3;  | $c_0$ s <sub>E</sub> day            |

**Table 3 Power prefixes**

| name                | symbol | Plain text | value                  | name          | symbol | Plain text | value                   |
|---------------------|--------|------------|------------------------|---------------|--------|------------|-------------------------|
| dirac <sup>10</sup> |        | D          | 10;                    |               |        |            |                         |
| <b>super</b>        |        | <b>S</b>   | <b>10;<sup>4</sup></b> | <b>sub</b>    |        | <b>s</b>   | <b>10;<sup>-4</sup></b> |
| <b>cosmic</b>       | +      | _+         | 10; <sup>8</sup> (=U)  | <b>atomic</b> | -      | _-         | U <sup>-1</sup>         |
| di-cosmic           | 2+     | _2+        | U <sup>2</sup>         | di-atomic     | 2-     | _2-        | U <sup>-2</sup>         |
| ter-cosmic          | 3+     | _3+        | U <sup>3</sup>         | ter-atomic    | 3-     | _3-        | U <sup>-3</sup>         |
| tetra-cosmic        | 4+     | _4+        | U <sup>4</sup>         | tetra-atomic  | 4-     | _4-        | U <sup>-4</sup>         |
| penta-cosmic        | 5+     | _5+        | U <sup>5</sup>         | penta-atomic  | 5-     | _5-        | U <sup>-5</sup>         |
| hexa-cosmic         | 6+     | _6+        | U <sup>6</sup>         | hexa-atomic   | 6-     | _6-        | U <sup>-6</sup>         |
| hepta-cosmic        | 7+     | _7+        | U <sup>7</sup>         | hepta-atomic  | 7-     | _7-        | U <sup>-7</sup>         |

<sup>8</sup> If this is expressed as 2;E, the error from CODATA (2014) becomes -2;53(-2.44) times standard deviation.

<sup>9</sup> This corresponds to the definition of the thermodynamic calorie.

<sup>10</sup> ‘dirac’ is only used when expressing the unit of the Gravitic System with the Harmonic System. (i.e., gravitic meter = tetra-atomic dirac harmon, gravitic second = penta-atomic dirac nic, gravitic gram = atomic dirac looloh)

**Table 4 Examples of natural scale quantity representation <sup>11</sup>**

| quantity                               | symbol                             | value   | refer to                              |
|--|------------------------------------|---|---------------------------------------|
| 2E; penta-cosmic Newton                | 2E; <sub>5+</sub> N                | 2E;×U <sup>5</sup> [harmonic] Newton            | the Planck force                      |
| 6;di-cosmic nic                        | 6; <sub>2+</sub> nc                | 6;×U <sup>2</sup> [harmonic]nic[second]         | the age of the universe               |
| cosmic super bit [Boltzmann]           | +Sf <sub>1</sub> [k <sub>B</sub> ] | U <sup>1</sup> @4log2 <sup>1</sup> [Boltzmann]  | 1.01 Tera Byte(=2 <sup>43</sup> ·bit) |
| cosmic harmon                          | +hm                                | U <sup>1</sup> harmon[ic meter]                 | the speed of light in vacuum          |
| unino atomic harmon                    | 0;1.hm                             | U <sup>-1</sup> @ <sup>1</sup> harmon[ic meter] | the Bohr radius                       |
| di-atomic Coulomb                      | <sub>2</sub> .C                    | U <sup>-2</sup> [universal] Coulomb             | the elementary charge                 |
| di-atomic effective Watt <sup>12</sup> | <sub>2</sub> .W <sub>e</sub>       | U <sup>-2</sup> [harmonic]effective Watt        | a photon power (540.THz)              |
| ter-atomic looloh                      | <sub>3</sub> .ℓℓ                   | U <sup>-3</sup> looloh                          | the unified atomic mass unit          |
| 2; tetra-atomic harmon                 | 2; <sub>4</sub> .hm                | 2;×U <sup>-4</sup> harmon[ic meter]             | the Planck length                     |

**Table 5 The Earth local extension for the Harmonic Universal Unit System**

| category                        |   | name / description  | symbol               | plain text                                       | value   |  |  |  |  |
|---------------------------------|---|---|----------------------|--|---|--|--|--|--|
| Non-coherent calendar time      | units   | nic-angle (or octal second)   | na                   |  | 10; <sup>-3</sup> ×2 <sup>-7</sup> day  |  |  |  |  |
|                                 |   | day   | day                  |  | 1 Ω <sub>1</sub>  |  |  |  |  |
|                                 |   |   |                      |  | ‘day’ corresponds to 86,400. s at the beginning of year 1900.   |  |  |  |  |
|                                 |   | year  | y or a               |  | (365.+ 31./128. ) days  |  |  |  |  |
|                                 | span (or octal century)   | span or “”  |                      | 64. years  |   |  |  |  |  |
| Non-coherent unit and constants | difference between thermodynamic temperature and 118,2354; K <sub>h</sub> (≐ -74.36°C)  | °S  | deg S                | 1,0000; K <sub>h</sub> (≐1.210724 K ÷ 23./19. K) |   |  |  |  |  |
|                                 |   |   |                      | 100; 0000°S is 99.9839 °C                        |   |  |  |  |  |
|                                 |   |   |                      | 78;0000°S is 37.0262°C                           |   |  |  |  |  |
|                                 |   |   |                      | 61;0000°S is 14.0224°C                           |   |  |  |  |  |
|                                 |   |   |                      | 51;5026°S is 0.0000°C                            |   |  |  |  |  |
|                                 | <table><tr><th colspan="2">approximate formula</th></tr><tr><td>°C = <math>\frac{1E;}{17;}</math>°S-62;4</td><td>°S = <math>\frac{17;}{1E;}</math>°C + 51;5</td></tr></table> | approximate formula   |                      | °C = $\frac{1E;}{17;}$ °S-62;4                   | °S = $\frac{17;}{1E;}$ °C + 51;5  |  |  | 99.9839 °C is the boiling point of water at the standard atmosphere. |  |
| approximate formula             |   |   |                      |  |   |  |  |  |  |
| °C = $\frac{1E;}{17;}$ °S-62;4  | °S = $\frac{17;}{1E;}$ °C + 51;5  |   |                      |  |   |  |  |  |  |
|                                 | supple-mentary constants  | the gravitational acceleration of the Earth (is called ‘gee [of Earth] ’)                   | <i>g<sub>E</sub></i> | <i>g_<sub>E</sub></i> or gee                     | 5;611X615 harmon/nic <sup>2</sup><br><i>g<sub>E</sub></i> is defined as <i>c</i> <sub>0</sub> <sup>2</sup> <i>r<sub>E</sub></i> ( <i>m<sub>E</sub></i> rad) <sup>-2</sup> |  |  |  |  |
|                                 |   | the rotation period of the Earth (is called ‘[Earth] solar’) at the beginning of year 1900. | <i>s<sub>E</sub></i> | <i>s_<sub>E</sub></i> or solar                   | 0;EEEEEE153565 nic/nic-angle (This should be ‘coordinated’.)  |  |  |  |  |
|                                 |   | the meridian length of the Earth (is called ‘[Earth] meridian’)                             | <i>m<sub>E</sub></i> | <i>m_<sub>E</sub></i> or meridian                | 4124,216E; harmon/Ω <sub>1</sub>  |  |  |  |  |

<sup>11</sup> The part enclosed with '[']' can be omitted in Table 4 and Table 5.

<sup>12</sup> Units for quantity weighted by dimensionless human sensitivity are indicated by 'effective'.

W<sub>e</sub> corresponds to 1;di-cosmic photon energy(540.THz) / nic and 115.667210 lumen.