# Constants (scipy.constants)

Physical and mathematical constants and units.

## Mathematical constants

| | |
|---|---|
| `pi` | Pi |
| `golden` | Golden ratio |
| `golden_ratio` | Golden ratio |

## Physical constants

| | |
|---|---|
| `c` | speed of light in vacuum |
| `speed_of_light` | speed of light in vacuum |
| `mu_0` | the magnetic constant $\mu_0$ |
| `epsilon_0` | the electric constant (vacuum permittivity), $\epsilon_0$ |
| `h` | the Planck constant $h$ |
| `Planck` | the Planck constant $h$ |
| `hbar` | $\hbar = h/(2\pi)$ |
| `G` | Newtonian constant of gravitation |
| `gravitational_constant` | Newtonian constant of gravitation |
| `g` | standard acceleration of gravity |
| `e` | elementary charge |
| `elementary_charge` | elementary charge |
| `R` | molar gas constant |
| `gas_constant` | molar gas constant |
| `alpha` | fine-structure constant |
| `fine_structure` | fine-structure constant |
| `N_A` | Avogadro constant |
| `Avogadro` | Avogadro constant |
| `k` | Boltzmann constant |
| `Boltzmann` | Boltzmann constant |
| `sigma` | Stefan-Boltzmann constant $\sigma$ |
| `Stefan_Boltzmann` | Stefan-Boltzmann constant $\sigma$ |
| `Wien` | Wien displacement law constant |
| `Rydberg` | Rydberg constant |
| `m_e` | electron mass |
| `electron_mass` | electron mass |
| `m_p` | proton mass |
| `proton_mass` | proton mass |
| `m_n` | neutron mass |
| `neutron_mass` | neutron mass |

### Constants database

In addition to the above variables, scipy.constants also contains the 2014 CODATA recommended values [CODATA2014] database containing more physical constants.

| | |
|---|---|
| value (generated/scipy.constants.value.html#scipy.constants.value)(key) | Value in physical_constants indexed by key |
| unit (generated/scipy.constants.unit.html#scipy.constants.unit)(key) | Unit in physical_constants indexed by key |
| precision (generated/scipy.constants.precision.html#scipy.constants.precision)(key) | Relative precision in physical_constants indexed by key |
| find (generated/scipy.constants.find.html#scipy.constants.find)([sub, disp]) | Return list of physical_constant keys containing a given string. |
| ConstantWarning (generated/scipy.constants.ConstantWarning.html#scipy.constants.ConstantWarning) | Accessing a constant no longer in current CODATA data set |

#### scipy.constants.physical_constants

Dictionary of physical constants, of the format `physical_constants[name] = (value, unit, uncertainty)`.

Available constants:

| | |
|---|---|
| `alpha particle mass` | 6.64465723e-27 kg |
| `alpha particle mass energy equivalent` | 5.971920097e-10 J |
| `alpha particle mass energy equivalent in MeV` | 3727.379378 MeV |
| `alpha particle mass in u` | 4.00150617913 u |
| `alpha particle molar mass` | 0.00400150617913 kg mol^-1 |

| | |
|---|---|
| alpha particle-electron mass ratio | 7294.29954136 |
| alpha particle-proton mass ratio | 3.97259968907 |
| Angstrom star | 1.00001495e-10 m |
| atomic mass constant | 1.66053904e-27 kg |
| atomic mass constant energy equivalent | 1.492418062e-10 J |
| atomic mass constant energy equivalent in MeV | 931.4940954 MeV |
| atomic mass unit-electron volt relationship | 931494095.4 eV |
| atomic mass unit-hartree relationship | 34231776.902 E_h |
| atomic mass unit-hertz relationship | 2.2523427206e+23 Hz |
| atomic mass unit-inverse meter relationship | 7.5130066166e+14 m^-1 |
| atomic mass unit-joule relationship | 1.492418062e-10 J |
| atomic mass unit-kelvin relationship | 1.08095438e+13 K |
| atomic mass unit-kilogram relationship | 1.66053904e-27 kg |
| atomic unit of 1st hyperpolarizability | 3.206361329e-53 C^3 m^3 J^-2 |
| atomic unit of 2nd hyperpolarizability | 6.235380085e-65 C^4 m^4 J^-3 |
| atomic unit of action | 1.0545718e-34 J s |
| atomic unit of charge | 1.6021766208e-19 C |
| atomic unit of charge density | 1.081202377e+12 C m^-3 |
| atomic unit of current | 0.006623618183 A |
| atomic unit of electric dipole mom. | 8.478353552e-30 C m |
| atomic unit of electric field | 5.142206707e+11 V m^-1 |
| atomic unit of electric field gradient | 9.717362356e+21 V m^-2 |
| atomic unit of electric polarizability | 1.6487772731e-41 C^2 m^2 J^-1 |
| atomic unit of electric potential | 27.21138602 V |
| atomic unit of electric quadrupole mom. | 4.486551484e-40 C m^2 |
| atomic unit of energy | 4.35974465e-18 J |
| atomic unit of force | 8.23872336e-08 N |
| atomic unit of length | 5.2917721067e-11 m |
| atomic unit of mag. dipole mom. | 1.854801999e-23 J T^-1 |
| atomic unit of mag. flux density | 235051.755 T |
| atomic unit of magnetizability | 7.8910365886e-29 J T^-2 |
| atomic unit of mass | 9.10938356e-31 kg |
| atomic unit of mom.um | 1.992851882e-24 kg m s^-1 |
| atomic unit of permittivity | 1.11265005605e-10 F m^-1 |
| atomic unit of time | 2.41888432651e-17 s |
| atomic unit of velocity | 2187691.26277 m s^-1 |
| Avogadro constant | 6.022140857e+23 mol^-1 |
| Bohr magneton | 9.274009994e-24 J T^-1 |
| Bohr magneton in eV/T | 5.7883818012e-05 eV T^-1 |
| Bohr magneton in Hz/T | 13996245042.0 Hz T^-1 |
| Bohr magneton in inverse meters per tesla | 46.68644814 m^-1 T^-1 |
| Bohr magneton in K/T | 0.67171405 K T^-1 |
| Bohr radius | 5.2917721067e-11 m |
| Boltzmann constant | 1.38064852e-23 J K^-1 |
| Boltzmann constant in eV/K | 8.6173303e-05 eV K^-1 |
| Boltzmann constant in Hz/K | 20836612000.0 Hz K^-1 |
| Boltzmann constant in inverse meters per kelvin | 69.503457 m^-1 K^-1 |
| characteristic impedance of vacuum | 376.730313462 ohm |
| classical electron radius | 2.8179403227e-15 m |
| Compton wavelength | 2.4263102367e-12 m |
| Compton wavelength over 2 pi | 3.8615926764e-13 m |
| conductance quantum | 7.748091731e-05 S |
| conventional value of Josephson constant | 4.835979e+14 Hz V^-1 |
| conventional value of von Klitzing constant | 25812.807 ohm |
| Cu x unit | 1.00207697e-13 m |
| deuteron g factor | 0.8574382311 |
| deuteron mag. mom. | 4.33073504e-27 J T^-1 |
| deuteron mag. mom. to Bohr magneton ratio | 0.0004669754554 |
| deuteron mag. mom. to nuclear magneton ratio | 0.8574382311 |
| deuteron mass | 3.343583719e-27 kg |
| deuteron mass energy equivalent | 3.005063183e-10 J |
| deuteron mass energy equivalent in MeV | 1875.612928 MeV |
| deuteron mass in u | 2.01355321275 u |
| deuteron molar mass | 0.00201355321274 kg mol^-1 |
| deuteron rms charge radius | 2.1413e-15 m |
| deuteron-electron mag. mom. ratio | -0.0004664345535 |
| deuteron-electron mass ratio | 3670.48296785 |
| deuteron-neutron mag. mom. ratio | -0.44820652 |
| deuteron-proton mag. mom. ratio | 0.3070122077 |
| deuteron-proton mass ratio | 1.99900750087 |
| electric constant | 8.85418781762e-12 F m^-1 |

| | |
|---|---|
| electron charge to mass quotient | -1.758820024e+11 C kg^-1 |
| electron g factor | -2.00231930436 |
| electron gyromag. ratio | 1.760859644e+11 s^-1 T^-1 |
| electron gyromag. ratio over 2 pi | 28024.95164 MHz T^-1 |
| electron mag. mom. | -9.28476462e-24 J T^-1 |
| electron mag. mom. anomaly | 0.00115965218091 |
| electron mag. mom. to Bohr magneton ratio | -1.00115965218 |
| electron mag. mom. to nuclear magneton ratio | -1838.28197234 |
| electron mass | 9.10938356e-31 kg |
| electron mass energy equivalent | 8.18710565e-14 J |
| electron mass energy equivalent in MeV | 0.5109989461 MeV |
| electron mass in u | 0.00054857990907 u |
| electron molar mass | 5.4857990907e-07 kg mol^-1 |
| electron to alpha particle mass ratio | 0.00013709335548 |
| electron to shielded helion mag. mom. ratio | 864.058257 |
| electron to shielded proton mag. mom. ratio | -658.2275971 |
| electron volt | 1.6021766208e-19 J |
| electron volt-atomic mass unit relationship | 1.0735441105e-09 u |
| electron volt-hartree relationship | 0.03674932248 E_h |
| electron volt-hertz relationship | 2.417989262e+14 Hz |
| electron volt-inverse meter relationship | 806554.4005 m^-1 |
| electron volt-joule relationship | 1.6021766208e-19 J |
| electron volt-kelvin relationship | 11604.5221 K |
| electron volt-kilogram relationship | 1.782661907e-36 kg |
| electron-deuteron mag. mom. ratio | -2143.923499 |
| electron-deuteron mass ratio | 0.000272443710748 |
| electron-helion mass ratio | 0.000181954307485 |
| electron-muon mag. mom. ratio | 206.766988 |
| electron-muon mass ratio | 0.0048363317 |
| electron-neutron mag. mom. ratio | 960.9205 |
| electron-neutron mass ratio | 0.00054386734428 |
| electron-proton mag. mom. ratio | -658.2106866 |
| electron-proton mass ratio | 0.000544617021352 |
| electron-tau mass ratio | 0.000287592 |
| electron-triton mass ratio | 0.00018192000622 |
| elementary charge | 1.6021766208e-19 C |
| elementary charge over h | 2.417989262e+14 A J^-1 |
| Faraday constant | 96485.33289 C mol^-1 |
| Faraday constant for conventional electric current | 96485.3251 C_90 mol^-1 |
| Fermi coupling constant | 1.1663787e-05 GeV^-2 |
| fine-structure constant | 0.0072973525664 |
| first radiation constant | 3.74177179e-16 W m^2 |
| first radiation constant for spectral radiance | 1.191042953e-16 W m^2 sr^-1 |
| Hartree energy | 4.35974465e-18 J |
| Hartree energy in eV | 27.21138602 eV |
| hartree-atomic mass unit relationship | 2.9212623197e-08 u |
| hartree-electron volt relationship | 27.21138602 eV |
| hartree-hertz relationship | 6.57968392071e+15 Hz |
| hartree-inverse meter relationship | 21947463.137 m^-1 |
| hartree-joule relationship | 4.35974465e-18 J |
| hartree-kelvin relationship | 315775.13 K |
| hartree-kilogram relationship | 4.850870129e-35 kg |
| helion g factor | -4.255250616 |
| helion mag. mom. | -1.074617522e-26 J T^-1 |
| helion mag. mom. to Bohr magneton ratio | -0.001158740958 |
| helion mag. mom. to nuclear magneton ratio | -2.127625308 |
| helion mass | 5.0064127e-27 kg |
| helion mass energy equivalent | 4.499539341e-10 J |
| helion mass energy equivalent in MeV | 2808.391586 MeV |
| helion mass in u | 3.01493224673 u |
| helion molar mass | 0.00301493224673 kg mol^-1 |
| helion-electron mass ratio | 5495.88527922 |
| helion-proton mass ratio | 2.99315267046 |
| hertz-atomic mass unit relationship | 4.4398216616e-24 u |
| hertz-electron volt relationship | 4.135667662e-15 eV |
| hertz-hartree relationship | 1.51982984601e-16 E_h |
| hertz-inverse meter relationship | 3.33564095198e-09 m^-1 |
| hertz-joule relationship | 6.62607004e-34 J |
| hertz-kelvin relationship | 4.7992447e-11 K |
| hertz-kilogram relationship | 7.372497201e-51 kg |
| inverse fine-structure constant | 137.035999139 |
| inverse meter-atomic mass unit relationship | 1.331025049e-15 u |

| | |
|---|---|
| inverse meter-electron volt relationship | 1.2398419739e-06 eV |
| inverse meter-hartree relationship | 4.55633525277e-08 E_h |
| inverse meter-hertz relationship | 299792458.0 Hz |
| inverse meter-joule relationship | 1.986445824e-25 J |
| inverse meter-kelvin relationship | 0.0143877736 K |
| inverse meter-kilogram relationship | 2.210219057e-42 kg |
| inverse of conductance quantum | 12906.4037278 ohm |
| Josephson constant | 4.835978525e+14 Hz V^-1 |
| joule-atomic mass unit relationship | 6700535363.0 u |
| joule-electron volt relationship | 6.241509126e+18 eV |
| joule-hartree relationship | 2.293712317e+17 E_h |
| joule-hertz relationship | 1.509190205e+33 Hz |
| joule-inverse meter relationship | 5.034116651e+24 m^-1 |
| joule-kelvin relationship | 7.2429731e+22 K |
| joule-kilogram relationship | 1.11265005605e-17 kg |
| kelvin-atomic mass unit relationship | 9.2510842e-14 u |
| kelvin-electron volt relationship | 8.6173303e-05 eV |
| kelvin-hartree relationship | 3.1668105e-06 E_h |
| kelvin-hertz relationship | 20836612000.0 Hz |
| kelvin-inverse meter relationship | 69.503457 m^-1 |
| kelvin-joule relationship | 1.38064852e-23 J |
| kelvin-kilogram relationship | 1.53617865e-40 kg |
| kilogram-atomic mass unit relationship | 6.022140857e+26 u |
| kilogram-electron volt relationship | 5.60958865e+35 eV |
| kilogram-hartree relationship | 2.061485823e+34 E_h |
| kilogram-hertz relationship | 1.356392512e+50 Hz |
| kilogram-inverse meter relationship | 4.524438411e+41 m^-1 |
| kilogram-joule relationship | 8.98755178737e+16 J |
| kilogram-kelvin relationship | 6.5096595e+39 K |
| lattice parameter of silicon | 5.431020504e-10 m |
| Loschmidt constant (273.15 K, 100 kPa) | 2.6516467e+25 m^-3 |
| Loschmidt constant (273.15 K, 101.325 kPa) | 2.6867811e+25 m^-3 |
| mag. constant | 1.25663706144e-06 N A^-2 |
| mag. flux quantum | 2.067833831e-15 Wb |
| Mo x unit | 1.00209952e-13 m |
| molar gas constant | 8.3144598 J mol^-1 K^-1 |
| molar mass constant | 0.001 kg mol^-1 |
| molar mass of carbon-12 | 0.012 kg mol^-1 |
| molar Planck constant | 3.990312711e-10 J s mol^-1 |
| molar Planck constant times c | 0.119626565582 J m mol^-1 |
| molar volume of ideal gas (273.15 K, 100 kPa) | 0.022710947 m^3 mol^-1 |
| molar volume of ideal gas (273.15 K, 101.325 kPa) | 0.022413962 m^3 mol^-1 |
| molar volume of silicon | 1.205883214e-05 m^3 mol^-1 |
| muon Compton wavelength | 1.173444111e-14 m |
| muon Compton wavelength over 2 pi | 1.867594308e-15 m |
| muon g factor | -2.0023318418 |
| muon mag. mom. | -4.49044826e-26 J T^-1 |
| muon mag. mom. anomaly | 0.00116592089 |
| muon mag. mom. to Bohr magneton ratio | -0.00484197048 |
| muon mag. mom. to nuclear magneton ratio | -8.89059705 |
| muon mass | 1.883531594e-28 kg |
| muon mass energy equivalent | 1.692833774e-11 J |
| muon mass energy equivalent in MeV | 105.6583745 MeV |
| muon mass in u | 0.1134289257 u |
| muon molar mass | 0.0001134289257 kg mol^-1 |
| muon-electron mass ratio | 206.7682826 |
| muon-neutron mass ratio | 0.1124545167 |
| muon-proton mag. mom. ratio | -3.183345142 |
| muon-proton mass ratio | 0.1126095262 |
| muon-tau mass ratio | 0.0594649 |
| natural unit of action | 1.0545718e-34 J s |
| natural unit of action in eV s | 6.582119514e-16 eV s |
| natural unit of energy | 8.18710565e-14 J |
| natural unit of energy in MeV | 0.5109989461 MeV |
| natural unit of length | 3.8615926764e-13 m |
| natural unit of mass | 9.10938356e-31 kg |
| natural unit of mom.um | 2.730924488e-22 kg m s^-1 |
| natural unit of mom.um in MeV/c | 0.5109989461 MeV/c |
| natural unit of time | 1.28808866712e-21 s |
| natural unit of velocity | 299792458.0 m s^-1 |
| neutron Compton wavelength | 1.31959090481e-15 m |
| neutron Compton wavelength over 2 pi | 2.1001941536e-16 m |

| | |
|---|---|
| neutron g factor | -3.82608545 |
| neutron gyromag. ratio | 183247172.0 s^-1 T^-1 |
| neutron gyromag. ratio over 2 pi | 29.1646933 MHz T^-1 |
| neutron mag. mom. | -9.662365e-27 J T^-1 |
| neutron mag. mom. to Bohr magneton ratio | -0.00104187563 |
| neutron mag. mom. to nuclear magneton ratio | -1.91304273 |
| neutron mass | 1.674927471e-27 kg |
| neutron mass energy equivalent | 1.505349739e-10 J |
| neutron mass energy equivalent in MeV | 939.5654133 MeV |
| neutron mass in u | 1.00866491588 u |
| neutron molar mass | 0.00100866491588 kg mol^-1 |
| neutron to shielded proton mag. mom. ratio | -0.68499694 |
| neutron-electron mag. mom. ratio | 0.00104066882 |
| neutron-electron mass ratio | 1838.68366158 |
| neutron-muon mass ratio | 8.89248408 |
| neutron-proton mag. mom. ratio | -0.68497934 |
| neutron-proton mass difference | 2.30557377e-30 |
| neutron-proton mass difference energy equivalent | 2.07214637e-13 |
| neutron-proton mass difference energy equivalent in MeV | 1.29333205 |
| neutron-proton mass difference in u | 0.001388449 |
| neutron-proton mass ratio | 1.00137841898 |
| neutron-tau mass ratio | 0.52879 |
| Newtonian constant of gravitation | 6.67408e-11 m^3 kg^-1 s^-2 |
| Newtonian constant of gravitation over h-bar c | 6.70861e-39 (GeV/c^2)^-2 |
| nuclear magneton | 5.050783699e-27 J T^-1 |
| nuclear magneton in eV/T | 3.152451255e-08 eV T^-1 |
| nuclear magneton in inverse meters per tesla | 0.02542623432 m^-1 T^-1 |
| nuclear magneton in K/T | 0.0003658269 K T^-1 |
| nuclear magneton in MHz/T | 7.622593285 MHz T^-1 |
| Planck constant | 6.62607004e-34 J s |
| Planck constant in eV s | 4.135667662e-15 eV s |
| Planck constant over 2 pi | 1.0545718e-34 J s |
| Planck constant over 2 pi in eV s | 6.582119514e-16 eV s |
| Planck constant over 2 pi times c in MeV fm | 197.3269788 MeV fm |
| Planck length | 1.616229e-35 m |
| Planck mass | 2.17647e-08 kg |
| Planck mass energy equivalent in GeV | 1.22091e+19 GeV |
| Planck temperature | 1.416808e+32 K |
| Planck time | 5.39116e-44 s |
| proton charge to mass quotient | 95788332.26 C kg^-1 |
| proton Compton wavelength | 1.32140985396e-15 m |
| proton Compton wavelength over 2 pi | 2.10308910109e-16 m |
| proton g factor | 5.585694702 |
| proton gyromag. ratio | 267522190.0 s^-1 T^-1 |
| proton gyromag. ratio over 2 pi | 42.57747892 MHz T^-1 |
| proton mag. mom. | 1.4106067873e-26 J T^-1 |
| proton mag. mom. to Bohr magneton ratio | 0.0015210322053 |
| proton mag. mom. to nuclear magneton ratio | 2.7928473508 |
| proton mag. shielding correction | 2.5691e-05 |
| proton mass | 1.672621898e-27 kg |
| proton mass energy equivalent | 1.503277593e-10 J |
| proton mass energy equivalent in MeV | 938.2720813 MeV |
| proton mass in u | 1.00727646688 u |
| proton molar mass | 0.00100727646688 kg mol^-1 |
| proton rms charge radius | 8.751e-16 m |
| proton-electron mass ratio | 1836.15267389 |
| proton-muon mass ratio | 8.88024338 |
| proton-neutron mag. mom. ratio | -1.45989805 |
| proton-neutron mass ratio | 0.99862347844 |
| proton-tau mass ratio | 0.528063 |
| quantum of circulation | 0.00036369475486 m^2 s^-1 |
| quantum of circulation times 2 | 0.00072738950972 m^2 s^-1 |
| Rydberg constant | 10973731.5685 m^-1 |
| Rydberg constant times c in Hz | 3.28984196036e+15 Hz |
| Rydberg constant times hc in eV | 13.605693009 eV |
| Rydberg constant times hc in J | 2.179872325e-18 J |
| Sackur-Tetrode constant (1 K, 100 kPa) | -1.1517084 |
| Sackur-Tetrode constant (1 K, 101.325 kPa) | -1.1648714 |
| second radiation constant | 0.0143877736 m K |
| shielded helion gyromag. ratio | 203789458.5 s^-1 T^-1 |
| shielded helion gyromag. ratio over 2 pi | 32.43409966 MHz T^-1 |
| shielded helion mag. mom. | -1.07455308e-26 J T^-1 |

| | |
|---|---|
| shielded helion mag. mom. to Bohr magneton ratio | -0.001158671471 |
| shielded helion mag. mom. to nuclear magneton ratio | -2.12749772 |
| shielded helion to proton mag. mom. ratio | -0.7617665603 |
| shielded helion to shielded proton mag. mom. ratio | -0.7617861313 |
| shielded proton gyromag. ratio | 267515317.1 s^-1 T^-1 |
| shielded proton gyromag. ratio over 2 pi | 42.57638507 MHz T^-1 |
| shielded proton mag. mom. | 1.410570547e-26 J T^-1 |
| shielded proton mag. mom. to Bohr magneton ratio | 0.001520993128 |
| shielded proton mag. mom. to nuclear magneton ratio | 2.7927756 |
| speed of light in vacuum | 299792458.0 m s^-1 |
| standard acceleration of gravity | 9.80665 m s^-2 |
| standard atmosphere | 101325.0 Pa |
| standard-state pressure | 100000.0 Pa |
| Stefan-Boltzmann constant | 5.670367e-08 W m^-2 K^-4 |
| tau Compton wavelength | 6.97787e-16 m |
| tau Compton wavelength over 2 pi | 1.11056e-16 m |
| tau mass | 3.16747e-27 kg |
| tau mass energy equivalent | 2.84678e-10 J |
| tau mass energy equivalent in MeV | 1776.82 MeV |
| tau mass in u | 1.90749 u |
| tau molar mass | 0.00190749 kg mol^-1 |
| tau-electron mass ratio | 3477.15 |
| tau-muon mass ratio | 16.8167 |
| tau-neutron mass ratio | 1.89111 |
| tau-proton mass ratio | 1.89372 |
| Thomson cross section | 6.6524587158e-29 m^2 |
| triton g factor | 5.95792492 |
| triton mag. mom. | 1.504609503e-26 J T^-1 |
| triton mag. mom. to Bohr magneton ratio | 0.0016223936616 |
| triton mag. mom. to nuclear magneton ratio | 2.97896246 |
| triton mass | 5.007356665e-27 kg |
| triton mass energy equivalent | 4.500387735e-10 J |
| triton mass energy equivalent in MeV | 2808.921112 MeV |
| triton mass in u | 3.01550071632 u |
| triton molar mass | 0.00301550071632 kg mol^-1 |
| triton-electron mass ratio | 5496.92153588 |
| triton-proton mass ratio | 2.99371703348 |
| unified atomic mass unit | 1.66053904e-27 kg |
| von Klitzing constant | 25812.8074555 ohm |
| weak mixing angle | 0.2223 |
| Wien frequency displacement law constant | 58789238000.0 Hz K^-1 |
| Wien wavelength displacement law constant | 0.0028977729 m K |
| {220} lattice spacing of silicon | 1.920155714e-10 m |

## Units

### SI prefixes

| | |
|---|---|
| yotta | $10^{24}$ |
| zetta | $10^{21}$ |
| exa | $10^{18}$ |
| peta | $10^{15}$ |
| tera | $10^{12}$ |
| giga | $10^{9}$ |
| mega | $10^{6}$ |
| kilo | $10^{3}$ |
| hecto | $10^{2}$ |
| deka | $10^{1}$ |
| deci | $10^{-1}$ |
| centi | $10^{-2}$ |
| milli | $10^{-3}$ |
| micro | $10^{-6}$ |
| nano | $10^{-9}$ |
| pico | $10^{-12}$ |
| femto | $10^{-15}$ |
| atto | $10^{-18}$ |
| zepto | $10^{-21}$ |

### Binary prefixes

| | |
|---|---|
| kibi | $2^{10}$ |

| | |
|---|---|
| `mebi` | $2^{20}$ |
| `gibi` | $2^{30}$ |
| `tebi` | $2^{40}$ |
| `pebi` | $2^{50}$ |
| `exbi` | $2^{60}$ |
| `zebi` | $2^{70}$ |
| `yobi` | $2^{80}$ |

## Weight

| | |
|---|---|
| `gram` | $10^{-3}$ kg |
| `metric_ton` | $10^{3}$ kg |
| `grain` | one grain in kg |
| `lb` | one pound (avoirdupous) in kg |
| `pound` | one pound (avoirdupous) in kg |
| `oz` | one ounce in kg |
| `ounce` | one ounce in kg |
| `stone` | one stone in kg |
| `grain` | one grain in kg |
| `long_ton` | one long ton in kg |
| `short_ton` | one short ton in kg |
| `troy_ounce` | one Troy ounce in kg |
| `troy_pound` | one Troy pound in kg |
| `carat` | one carat in kg |
| `m_u` | atomic mass constant (in kg) |
| `u` | atomic mass constant (in kg) |
| `atomic_mass` | atomic mass constant (in kg) |

## Angle

| | |
|---|---|
| `degree` | degree in radians |
| `arcmin` | arc minute in radians |
| `arcminute` | arc minute in radians |
| `arcsec` | arc second in radians |
| `arcsecond` | arc second in radians |

## Time

| | |
|---|---|
| `minute` | one minute in seconds |
| `hour` | one hour in seconds |
| `day` | one day in seconds |
| `week` | one week in seconds |
| `year` | one year (365 days) in seconds |
| `Julian_year` | one Julian year (365.25 days) in seconds |

## Length

| | |
|---|---|
| `inch` | one inch in meters |
| `foot` | one foot in meters |
| `yard` | one yard in meters |
| `mile` | one mile in meters |
| `mil` | one mil in meters |
| `pt` | one point in meters |
| `point` | one point in meters |
| `survey_foot` | one survey foot in meters |
| `survey_mile` | one survey mile in meters |
| `nautical_mile` | one nautical mile in meters |
| `fermi` | one Fermi in meters |
| `angstrom` | one Angstrom in meters |
| `micron` | one micron in meters |
| `au` | one astronomical unit in meters |
| `astronomical_unit` | one astronomical unit in meters |
| `light_year` | one light year in meters |
| `parsec` | one parsec in meters |

## Pressure

| | |
|---|---|
| `atm` | standard atmosphere in pascals |
| `atmosphere` | standard atmosphere in pascals |
| `bar` | one bar in pascals |
| `torr` | one torr (mmHg) in pascals |
| `mmHg` | one torr (mmHg) in pascals |
| `psi` | one psi in pascals |

## Area

| | |
|---|---|
| `hectare` | one hectare in square meters |
| `acre` | one acre in square meters |

## Volume

| | |
|---|---|
| `liter` | one liter in cubic meters |
| `litre` | one liter in cubic meters |
| `gallon` | one gallon (US) in cubic meters |
| `gallon_US` | one gallon (US) in cubic meters |
| `gallon_imp` | one gallon (UK) in cubic meters |
| `fluid_ounce` | one fluid ounce (US) in cubic meters |
| `fluid_ounce_US` | one fluid ounce (US) in cubic meters |
| `fluid_ounce_imp` | one fluid ounce (UK) in cubic meters |
| `bbl` | one barrel in cubic meters |
| `barrel` | one barrel in cubic meters |

## Speed

| | |
|---|---|
| `kmh` | kilometers per hour in meters per second |
| `mph` | miles per hour in meters per second |
| `mach` | one Mach (approx., at 15 C, 1 atm) in meters per second |
| `speed_of_sound` | one Mach (approx., at 15 C, 1 atm) in meters per second |
| `knot` | one knot in meters per second |

## Temperature

| | |
|---|---|
| `zero_Celsius` | zero of Celsius scale in Kelvin |
| `degree_Fahrenheit` | one Fahrenheit (only differences) in Kelvins |

| | |
|---|---|
| convert_temperature (generated/scipy.constants.convert_temperature.html#scipy.constants.convert_temperature)(val, old_scale, new_scale) | Convert from a temperature scale to another one Celsius, Kelvin, Fahrenheit and Rankine scales. |
| C2K (generated/scipy.constants.C2K.html#scipy.constants.C2K)(*args, **kwds) | C2K (generated/scipy.constants.C2K.html#scipy.const is deprecated! |
| K2C (generated/scipy.constants.K2C.html#scipy.constants.K2C)(*args, **kwds) | K2C (generated/scipy.constants.K2C.html#scipy.const is deprecated! |
| F2C (generated/scipy.constants.F2C.html#scipy.constants.F2C)(*args, **kwds) | F2C (generated/scipy.constants.F2C.html#scipy.consta is deprecated! |
| C2F (generated/scipy.constants.C2F.html#scipy.constants.C2F)(*args, **kwds) | C2F (generated/scipy.constants.C2F.html#scipy.consta is deprecated! |
| F2K (generated/scipy.constants.F2K.html#scipy.constants.F2K)(*args, **kwds) | F2K (generated/scipy.constants.F2K.html#scipy.consta is deprecated! |
| K2F (generated/scipy.constants.K2F.html#scipy.constants.K2F)(*args, **kwds) | K2F (generated/scipy.constants.K2F.html#scipy.consta is deprecated! |

## Energy

| | |
|---|---|
| `eV` | one electron volt in Joules |
| `electron_volt` | one electron volt in Joules |
| `calorie` | one calorie (thermochemical) in Joules |
| `calorie_th` | one calorie (thermochemical) in Joules |
| `calorie_IT` | one calorie (International Steam Table calorie, 1956) in Joules |
| `erg` | one erg in Joules |
| `Btu` | one British thermal unit (International Steam Table) in Joules |
| `Btu_IT` | one British thermal unit (International Steam Table) in Joules |
| `Btu_th` | one British thermal unit (thermochemical) in Joules |
| `ton_TNT` | one ton of TNT in Joules |

## Power

| | |
|---|---|
| `hp` | one horsepower in watts |
| `horsepower` | one horsepower in watts |

## Force

| | |
|---|---|
| `dyn` | one dyne in newtons |
| `dyne` | one dyne in newtons |

| | |
|---|---|
| `lbf` | one pound force in newtons |
| `pound_force` | one pound force in newtons |
| `kgf` | one kilogram force in newtons |
| `kilogram_force` | one kilogram force in newtons |

### Optics

| | |
|---|---|
| lambda2nu (generated/scipy.constants.lambda2nu.html#scipy.constants.lambda2nu)(lambda_) | Convert wavelength to optical frequency |
| nu2lambda (generated/scipy.constants.nu2lambda.html#scipy.constants.nu2lambda)(nu) | Convert optical frequency to wavelength. |

## References


**[CODATA2014]** CODATA Recommended Values of the Fundamental Physical Constants 2014.

http://physics.nist.gov/cuu/Constants/index.html (http://physics.nist.gov/cuu/Constants/index.html)