

Tables

The Basic Units of the SI System

Physical Quantity	SI Unit	Abbreviation
Length	1 meter	1 m
Mass	1 kilogram	1 kg
Time	1 second	1 s
Electric Current	1 ampere	1 A
Temperature	1 kelvin	1 K
Brightness	1 candela	1 cd
Amount of Substance	1 mole	1 mol

Derived SI base units

Quantity	Unit	SI base unit
Acceleration, a	1 m/s ²	1 m · s ⁻²
Work, A	1 J = 1 Nm	1 kg · m ² · s ⁻²
Density, ρ	1 kg/m ³	1 kg · m ⁻³
Effect, P	1 W = 1 J/s	1 kg · m ² · s ⁻³
Charge, Q	1 C	1 A · s
Voltage, U	1 V = 1 J/C	1 kg · m ² · s ⁻³ · A ⁻¹
Electric field, E	1 N/C = V/m	1 kg · m · s ⁻³ · A ⁻¹
Frequency, f	1 Hz	1 s ⁻¹
Inductance, L	1 H	1 kg · m ² · s ⁻² · A ⁻²
Capacitance, C	1 F	1 kg ⁻¹ · m ⁻² · s ⁴ · A ²
Force, F	1 N	1 kg · m · s ⁻²
Magnetic field, B	1 T	1 kg · s ⁻² · A ⁻¹
Resistance, R	1 Ω	1 kg · m ² · s ⁻³ · A ⁻²
Pressure, p	1Pa = 1 N/m ²	1 kg · m ⁻¹ · s ⁻²

SI-prefix

SI-prefix	Symbol	Decimal
Yotta	Y	$1e^{24}$
Zetta	Z	$1e^{21}$
Exa	E	$1e^{18}$
Peta	P	$1e^{15}$
Tera	T	$1e^{12}$
Giga	G	$1e^9$
Mega	M	$1e^6$
Kilo	k	$1e^3$
Hecto	h	$1e^2$
Deca	da	$1e^1$
Deci	d	$1e^{-1}$
Centi	c	$1e^{-2}$
Milli	m	$1e^{-3}$
Micro	μ	$1e^{-6}$
Nano	n	$1e^{-9}$
Pico	p	$1e^{-12}$
Femto	f	$1e^{-15}$
Atto	a	$1e^{-18}$
Zepto	z	$1e^{-21}$
Yocto	y	$1e^{-24}$

Constants

Name	Variable	Value	Unit
Speed of light in a vacuum	c	299 792 458	m/s
Planck's constant	h	$6.626\,070\,15 \cdot 10^{-34}$	Js
Planck's constant	h	$4.135\,667\,87 \cdot 10^{-15}$	eVs
Planck's constant	\hbar	$1.054\,573 \cdot 10^{-34}$	Js
Planck's constant	\hbar	$0.658\,212 \cdot 10^{-15}$	eVs
The Elemental Charge	e	$1.602\,176\,634 \cdot 10^{-19}$	C
Bohr Radius	a_0	$0.529\,177 \cdot 10^{-10}$	m
Electron Mass	m_e	$0.910\,938 \cdot 10^{-30}$	kg
Electron Mass	m_e	0.510 999	MeV/c ²
Proton Mass	m_p	$1.672\,6219 \cdot 10^{-27}$	kg
Proton Mass	m_p	938.2723	MeV/c ²
Proton Mass	m_p	1836.152 70	m_e
Neutron Mass	m_n	$1.674\,929 \cdot 10^{-27}$	kg
Neutron Mass	m_n	939.5656	MeV/c ²
Neutron Mass	m_n	1838.683 62	m_e
Boltzmanns Constant	k	$1.380649 \cdot 10^{-23}$	J/K
Boltzmanns Constant	k	$0.861\,739 \cdot 10^{-4}$	eV/K
Avogadros Constant	N_A	$6.02\,214\,076 \cdot 10^{23}$	mol ⁻¹
Rydbergs Constant	R_y	$\frac{\hbar^2}{2ma_0^2}$	
Rydbergs Constant	R_y	13.6057	eV
Rydbergs Constant	R_y	109 737.32	cm ⁻¹
The General Gas Constant	R	8.3145	J/(mol · K)
The Fine Structure Constant	α	$\frac{e^2}{4\pi\epsilon_0\hbar c} = \frac{1}{137.036}$	
Dielectric Constant for Vacuum	ϵ_0	$0.885\,419 \cdot 10^{-11}$	As/Vm
Permeability of Vacuum	μ_0	$1.256\,637 \cdot 10^{-6}$	Vs/Am
Permeability of Vacuum	μ_0	$4\pi \cdot 10^{-7}$	Vs/Am
The Bohr Magnetone	μ_B	$\frac{e\hbar}{2m} = 9.274\,02 \cdot 10^{-24}$	Am ²
The Acceleration of Gravity	g	9.80665m/s ²	

Pressure for Saturated Steam (boiling pressure) at Different Temperatures

	Water	Mercury
t/°C	Vapor Pressure/Pa	Vapor Pressure/Pa
-30	38.1	$637.0 \cdot 10^{-6}$
-20	103	$2.41 \cdot 10^{-3}$
-15	165	$4.52 \cdot 10^{-3}$
-10	260	$8.08 \cdot 10^{-3}$
-5	401	$14.3 \cdot 10^{-3}$
0	610	$24.7 \cdot 10^{-3}$
5	872	$40.7 \cdot 10^{-3}$
10	$1.23 \cdot 10^3$	$65.0 \cdot 10^{-3}$
15	$1.70 \cdot 10^3$	0.103
20	$2.34 \cdot 10^3$	0.160
25	$3.17 \cdot 10^3$	0.246
30	$4.24 \cdot 10^3$	0.370
35	$5.64 \cdot 10^3$	0.553
40	$7.37 \cdot 10^3$	0.810
50	$12.3 \cdot 10^3$	1.69
60	$19.9 \cdot 10^3$	3.37
70	$31.2 \cdot 10^3$	6.43
80	$47.3 \cdot 10^3$	11.9
90	$70.1 \cdot 10^3$	21.1
100	$101.3 \cdot 10^3$	36.4
110	$143.2 \cdot 10^3$	61.0
120	$198.4 \cdot 10^3$	99.4
130	$270.0 \cdot 10^3$	158.1
150	$476.0 \cdot 10^3$	$374.0 \cdot 10^3$
200	$1.55 \cdot 10^6$	$2.30 \cdot 10^3$
250	$3.97 \cdot 10^6$	$9.92 \cdot 10^3$
300	$8.59 \cdot 10^6$	$32.9 \cdot 10^3$
350	$16.5 \cdot 10^6$	$89.7 \cdot 10^3$
374	$22.1 \cdot 10^6$	$137.0 \cdot 10^3$
400	—	$210.0 \cdot 10^3$

Length Expansion Coefficient

Substance	$\alpha/(10^{-6}\text{K}^{-1})$	Substance	$\alpha/(10^{-6}\text{K}^{-1})$
Aluminum	23	Glass (typical value)	6.0
Silver	19	Tungsten	4.3
Brass	19	Marble(typical value)	2.5
Copper	17	Invar	2.0
Iron	12	Graphite	2.0
Steel	11	Diamond	1.2
Platinum	9.0	Quartz	0.4

Resistivity for Common Conductive Materials

Substance	$\rho/(10^{-8}\Omega\text{m})$	Substance	$\rho/(10^{-8}\Omega\text{m})$
Silver	1.59	Iron	10.0
Copper	1.68	Platinum	10.6
Gold	2.44	Constantan	49.0
Aluminum	2.82	Stainless Steel	69.0
Tungsten	5.60	Nichrome	120

Volume Expansion Coefficient

Substance	$\beta/(10^{-6}\text{K}^{-1})$	Substance	$\beta/(10^{-6}\text{K}^{-1})$
Acetone	1490	Glycerine	500
Gasoline	950	Water	210
Ethanol	750	Mercury	180

Density

Solid Substance	$\rho/(10^3\text{kg/m}^3)$	Fluid	$\rho/(10^3\text{kg/m}^3)$
Aluminum	2.70	Acetone	0.79
Lead	11.3	Blood	1.06
Gold	19.3	Ethanol	0.79
Iron	7.87	Ether	0.72
Copper	8.93	Glycol	1.12
Platinum	21.5	Mercury	13.6
Silver	10.5	Water	1.00
Tungsten	19.3	Vinegar	1.12

Specific Heat Capacity

Solid Substance	$c/(\text{kJ kg}^{-1}\text{K}^{-1})$	Fluid	$c/(\text{kJ kg}^{-1}\text{K}^{-1})$
Aluminum	0.90	Water	4.19
Marble	0.88	Sea Water	3.90
Porslin	0.84	Ether	3.72
Glas (typical value)	0.83	Methanol	2.55
Iron	0.44	Ethanol	2.49
Copper	0.39	Glycol	2.39
Brass	0.38	Vinegar	2.06
Silver	0.24	Olive Oil	1.97
Tungsten	0.14	Mercury	0.14

Viscosity

Fluid	$\eta/(10^{-3}\text{Pa}\cdot\text{s})$	Gas	$\eta/(10^{-6}\text{Pa}\cdot\text{s})$
Glycerine	1480	Oxygen	20.2
Engine Oil	1000	Helium	19.4
Mercury	1.55	Air	18.4
Ethanol	1.20	Nitrogen Gas	17.6
Water	1.00	Carbon Dioxide	14.8
Acetone	0.32	Hydrogen Gas	8.7

Specific Melting Heat and Steam Generating Heat, Melting Point and Boiling Point

Substance	I_S /(kJ/kg)	Melting Point/°C	$I_{\dot{a}}$ /(kJ/kg)	Boiling Point/°C
Helium			21	-269
Nitrogen Gas	26	-210	200	-196
Oxygen Gas	14	-218	210	-183
Methane	17	-182	130	-161
Ethanol	105	-114	841	78
Ether	113	-116	377	35
Mercury	12	-39	293	357
Water	333	0	2260	100
Sodium	113	98	4200	892
Lead	23	328	860	1744
Aluminum	398	660	10500	2467
Platinum	101	1769	2370	3827

Constants in Van der Waal's Equation and Molecule Radii

Gas	Chemical Name	$a/(10^{-2}\text{Pam}^6\text{mol}^{-2})$	$b/(10^{-5}\text{m}^3\text{mol}^{-1})$	$r/(10^{-10}\text{m})$
Ammonia	NH ₃	42.1	3.71	1.54
Argon	Ar	13.6	3.22	1.47
Helium	He	0.345	2.37	1.33
Carbon Dioxide	CO ₂	36.3	4.27	1.62
Carbon Monoxide	CO	15.0	3.99	1.58
Krypton	Kr	23.4	3.98	1.58
Mercury	Hg	81.7	1.70	1.19
Nitrogen Gas	N ₂	14.0	3.94	1.57
Oxygen Gas	O ₂	13.7	3.18	1.47
Water Vapor	H ₂ O	55.2	3.05	1.45
Hydrogen Gas	H ₂	2.47	2.66	1.38
Xenon	Xe	42.4	5.11	1.72

Triple Point

Substance	Name	T_T/K	p_T/kPa
Ammonia	NH ₃	195.4	6.07
Carbon Dioxide	CO ₂	216.55	517
Nitrogen Gas	N ₂	63.18	12.5
Neon	Ne	24.56	432
Oxygen Gas	O ₂	54.36	0.152
Water	H ₂ O	273.16	0.610
Hydrogen Gas	H ₂	13.80	7.04