KAAVALIITE / FORMELBILAGA

Vakioita ja muuntokertoimia / Konstanter och omvandlingsfaktorer

$a_o = 5{,}291772105 \cdot 10^{-11}$ m

$c = 299792458$ m s^{-1}

$e = 1{,}6021766346 \cdot 10^{-19}$ C

$\epsilon_o = 8{,}8541878188 \cdot 10^{-12}$F m^{-1}

$F = 96485$ C mol^{-1}

$g = 9{,}80665$ m s^{-2}

$G = 6{,}67430 \cdot 10^{-11}$ N m^{2}kg^{-2}

$h = 6{,}62607015 \cdot 10^{-34}$ J s

$k_B = 1{,}380649 \cdot 10^{-23}$ J K^{-1}

$\mu_o = 4\pi \cdot 10^{-7}$ H m^{-1}

$m_e = 9{,}1093837139 \cdot 10^{-31}$ kg

$m_n = 1{,}6749275006 \cdot 10^{-27}$ kg

$m_p = 1{,}6726219259 \cdot 10^{-27}$ kg

$N_A = 6{,}02214076 \cdot 10^{23}$ mol^{-1}

$R = 8{,}314462618$ J mol^{-1}K^{-1}

$= 0{,}08314462618$ bar dm^3 mol^{-1}K^{-1}

$R_H = 1{,}09678 \cdot 10^7$ m^{-1}

$\sigma = 5{,}670374 \cdot 10^{-8}$ W m^{-2}K^{-4}

0 °C = 273,15 K

1 atm = 101 325 Pa = 1,01325 bar

360° = 2π rad

Matematiikka / Matematik

$a_n = a_1 + (n-1)d, \quad \sum_{i=1}^{n} a_i = n \cdot \frac{a_1 + a_n}{2}$

$a_n = a_1 q^{n-1}, \qquad \sum_{i=1}^{n} a_i = a_1 \cdot \frac{1-q^n}{1-q}, \; q \neq 1$

$c^2 = a^2 + b^2 - 2ab\cos\gamma$

$\overline{a} \cdot \overline{b} = |\overline{a}||\overline{b}| \cdot \cos(\overline{a}, \overline{b})$

$\cos(\pi - \alpha) = -\cos\alpha, \qquad \sin(-\alpha) = -\sin\alpha$

$\cos(-\alpha) = \cos\alpha, \qquad \sin(\pi - \alpha) = \sin(\alpha)$

$K_n = Kq^n$

$P(X = r) = \binom{n}{r} p^r (1-p)^{n-r}$

$Dx^n = nx^{n-1}$

$De^x = e^x$

$D\sin x = \cos x$

$D\cos x = -\sin x$

$D(f(x) + g(x)) = f'(x) + g'(x)$

$D\big(f(x)g(x)\big) = f'(x)g(x) + f(x)g'(x)$

$D\big(f(g(x)\big) = f'\big(g(x)\big)g'(x)$

α	sin α	cos α
0	0	1
$\frac{\pi}{4}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$
$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$
$\frac{\pi}{2}$	1	0
π	0	−1

Fysiikka / Fysik

$A = \lambda N$

$a = \frac{v^2}{\mathrm{r}}$

$B = \mu_o H$

$B = \frac{\mu_o I}{2\pi r}$

$c = \frac{1}{\sqrt{\epsilon_o \mu_o}}$

$C = \frac{1}{\Sigma \frac{1}{C_i}}$

$C = \Sigma C_i$

$C = \epsilon_r \epsilon_o \frac{\mathrm{A}}{d}$

$C = \frac{Q}{U}$

$d \sin \alpha = k\lambda$

$2d \sin \theta = k\lambda$

$e = -\frac{\Delta \phi}{\Delta t}$

$E = \frac{1}{2} C U^2$

$E = \frac{1}{2} k x^2$

$E = \frac{1}{2} m v^2$

$E = \frac{F}{q}$

$E = \gamma m c^2$

$E = hf$

$E = mgh$

$E = qU$

$E = \frac{U}{d}$

$\epsilon = \epsilon_{\mathrm{r}} \epsilon_{\mathrm{o}}$

$\eta = \frac{E_{\mathrm{a}}}{E_{\mathrm{o}}}$

$\eta = \frac{W}{Q}$

$f = \frac{1}{T}$

$F = \gamma \frac{m_1 m_2}{r^2}$

$F = -kx$

$F = \frac{\mu_o I_1 I_2}{2\pi r} \ell$

$F = \mu N$

$F = \frac{q_1 q_2}{4\pi \epsilon_0 r^2}$

$\vec{F} = q(\vec{v} \times \vec{B})$

$\Phi = \vec{A} \cdot \vec{B}$

$I = F \Delta t$

$I = \frac{P}{A}$

$I = \frac{\Delta Q}{\Delta t}$

$I = \sigma T^4$

$\ell = \ell_0 (1 + \alpha \Delta T)$

$\lambda = \frac{b}{T}$

$\lambda = \frac{h}{p}$

$$\lambda = \frac{\ln 2}{T_{1/2}}$$

$$\vec{M} = \vec{r} \times \vec{F}$$

$$\mu = \mu_\mathrm{r}\mu_\mathrm{o}$$

$$n = \frac{c}{v}$$

$$n = \frac{m}{M}$$

$$n = \frac{N}{N_\mathrm{A}}$$

$$n_1 \sin\alpha_1 = n_2 \sin\alpha_2$$

$$N = N_o e^{-\lambda t}$$

$$N = \rho g V$$

$$p = \frac{F}{A}$$

$$p = \frac{nRT}{V}$$

$$\vec{p} = m\vec{v}$$

$$p = \rho g h$$

$$P = UI$$

$$P = \frac{W}{t}$$

$$Q = cm\Delta T$$

$$Q = rm$$

$$Q = sm$$

$$R = \rho\frac{l}{A}$$

$$R = \Sigma R_i$$

$$R = \frac{1}{\Sigma\frac{1}{R_i}}$$

$$\rho = \frac{m}{V}$$

$$T = 2\,\pi\sqrt{\frac{m}{k}}$$

$$T = \frac{2\pi}{\omega}$$

$$\Delta U = Q + W$$

$$U = RI$$

$$V = \frac{E}{q}$$

$$v = f\lambda$$

$$v = v_0 + at$$

$$V = V_0(1 + \gamma\Delta T)$$

$$W = \vec{F} \cdot \vec{s}$$

$$W = p\Delta V$$

$$x = x_0 + v_0 t + \frac{1}{2}at^2$$

Kemia / Kemi

$$n = \frac{m}{M}$$

$$n = \frac{N}{N_\mathrm{A}}$$

$$\rho = \frac{m}{V}$$

$$pV = nRT$$

$$It = nzF$$

$$\mathrm{pH} = \mathrm{p}K_\mathrm{a} + \lg\frac{[\mathrm{A}^-]}{[\mathrm{HA}]}$$

$$K_\mathrm{W} = 1{,}008 \cdot 10^{-14}\ (\mathrm{mol^2\ dm^{-6}}),\ \text{kun/när}\ T = 25\,^\circ\mathrm{C}$$

Alkuaineiden jaksollinen järjestelmä / Grundämnenas periodiska system

	1												13	14	15	16	17	18
1	$_1$**H** 1,008	2																$_2$**He** 4,003
2	$_3$**Li** 6,941	$_4$**Be** 9,012											$_5$**B** 10,81	$_6$**C** 12,01	$_7$**N** 14,01	$_8$**O** 16,00	$_9$**F** 19,00	$_{10}$**Ne** 20,18
3	$_{11}$**Na** 22,99	$_{12}$**Mg** 24,31	3	4	5	6	7	8	9	10	11	12	$_{13}$**Al** 26,98	$_{14}$**Si** 28,09	$_{15}$**P** 30,97	$_{16}$**S** 32,07	$_{17}$**Cl** 35,45	$_{18}$**Ar** 39,95
4	$_{19}$**K** 39,10	$_{20}$**Ca** 40,08	$_{21}$**Sc** 44,96	$_{22}$**Ti** 47,87	$_{23}$**V** 50,94	$_{24}$**Cr** 52,00	$_{25}$**Mn** 54,94	$_{26}$**Fe** 55,85	$_{27}$**Co** 58,93	$_{28}$**Ni** 58,69	$_{29}$**Cu** 63,55	$_{30}$**Zn** 65,38	$_{31}$**Ga** 69,72	$_{32}$**Ge** 72,63	$_{33}$**As** 74,92	$_{34}$**Se** 78,96	$_{35}$**Br** 79,90	$_{36}$**Kr** 83,80
5	$_{37}$**Rb** 85,47	$_{38}$**Sr** 87,62	$_{39}$**Y** 88,91	$_{40}$**Zr** 91,22	$_{41}$**Nb** 92,91	$_{42}$**Mo** 95,96	$_{43}$**Tc** (98)	$_{44}$**Ru** 101,07	$_{45}$**Rh** 102,91	$_{46}$**Pd** 106,42	$_{47}$**Ag** 107,87	$_{48}$**Cd** 112,41	$_{49}$**In** 114,82	$_{50}$**Sn** 118,71	$_{51}$**Sb** 121,76	$_{52}$**Te** 127,60	$_{53}$**I** 126,90	$_{54}$**Xe** 131,29
6	$_{55}$**Cs** 132,91	$_{56}$**Ba** 137,33	57 - 71	$_{72}$**Hf** 178,49	$_{73}$**Ta** 180,95	$_{74}$**W** 183,84	$_{75}$**Re** 186,21	$_{76}$**Os** 190,23	$_{77}$**Ir** 192,22	$_{78}$**Pt** 195,08	$_{79}$**Au** 196,97	$_{80}$**Hg** 200,59	$_{81}$**Tl** 204,38	$_{82}$**Pb** 207,2	$_{83}$**Bi** 208,98	$_{84}$**Po** (209)	$_{85}$**At** (210)	$_{86}$**Rn** (222)
7	$_{87}$**Fr** (223)	$_{88}$**Ra** (226)	89 - 103	$_{104}$**Rf** (261)	$_{105}$**Db** (262)	$_{106}$**Sg** (266)	$_{107}$**Bh** (264)	$_{108}$**Hs** (277)	$_{109}$**Mt** (268)	$_{110}$**Ds** (281)	$_{111}$**Rg** (272)	$_{112}$**Cn** (285)	$_{113}$**Nh** (286)	$_{114}$**Fl** (289)	$_{115}$**Mc** (288)	$_{116}$**Lv** (293)	$_{117}$**Ts** (294)	$_{118}$**Og** (294)

(57 - 71):	$_{57}$**La** 138,91	$_{58}$**Ce** 140,12	$_{59}$**Pr** 140,91	$_{60}$**Nd** 144,24	$_{61}$**Pm** (145)	$_{62}$**Sm** 150,36	$_{63}$**Eu** 151,96	$_{64}$**Gd** 157,25	$_{65}$**Tb** 158,93	$_{66}$**Dy** 162,50	$_{67}$**Ho** 164,93	$_{68}$**Er** 167,26	$_{69}$**Tm** 168,93	$_{70}$**Yb** 173,05	$_{71}$**Lu** 174,97
(89 - 103):	$_{89}$**Ac** (227)	$_{90}$**Th** 232,04	$_{91}$**Pa** 231,04	$_{92}$**U** 238,03	$_{93}$**Np** (237)	$_{94}$**Pu** (244)	$_{95}$**Am** (243)	$_{96}$**Cm** (247)	$_{97}$**Bk** (247)	$_{98}$**Cf** (251)	$_{99}$**Es** (252)	$_{100}$**Fm** (257)	$_{101}$**Md** (258)	$_{102}$**No** (259)	$_{103}$**Lr** (262)