KAAVALIITE/FORMELBILAGA

Vakioita / Konstanter

$N_A = 6{,}022\,140\,76 \cdot 10^{23}\,1/\text{mol}$
$G = 6{,}674 \cdot 10^{-11}\,\text{Nm}^2/\text{kg}^2$
$e = 1{,}602\,176\,634 \cdot 10^{-19}\,\text{C}$
$F = 96\,485\,\text{C/mol}$
$g = 9{,}81\,\text{m/s}^2$
$h = 6{,}626\,070\,15 \cdot 10^{-34}\,\text{J} \cdot \text{s}$
$h = 4{,}135\,7 \cdot 10^{-15}\,\text{eV} \cdot \text{s}$
$\sigma = 5{,}670 \cdot 10^{-8}\,\text{W}/(\text{m}^2 \cdot \text{K}^4)$
$\varepsilon_0 = 8{,}85 \cdot 10^{-12}\,\text{F/m}$
$\mu_0 \approx 4\pi \cdot 10^{-7}\,\text{Vs/(Am)} \approx 1{,}257 \cdot 10^{-6}\,\text{Vs/(Am)}$
$c = 299\,792\,458\,\text{m/s}$
$c_a = 343\,\text{m/s}$
$R_\text{H} = 1{,}096\,8 \cdot 10^7\,\text{m}^{-1}$
$c(\text{H}_2\text{O}) = 4{,}19\,\text{kJ}/(\text{kg} \cdot \text{K})$
$K_w = 1{,}008 \cdot 10^{-14}\,(\text{mol/l})^2$

$R = 8{,}314\,46\,\text{Pa} \cdot \text{m}^3/(\text{mol} \cdot \text{K})$
$\quad = 0{,}083\,144\,6\,(\text{bar} \cdot \text{dm}^3)/(\text{mol} \cdot \text{K})$
$e \approx 2{,}718\,28$
$\pi \approx 3{,}1416$

protoni/proton: $\quad m_p = 1{,}672\,621\,6 \cdot 10^{-27}\,\text{kg}$
neutroni/neutron: $\quad m_n = 1{,}674\,927\,3 \cdot 10^{-27}\,\text{kg}$
elektroni/elektron: $\quad m_e = 9{,}109\,382\,2 \cdot 10^{-31}\,\text{kg}$
$\quad u = 931{,}49\,\text{MeV/c}^2$
$\quad = 1{,}660\,538\,9 \cdot 10^{-27}\,\text{kg}$
$\quad m_p = 1{,}007\,276\,5\,\text{u}$
$\quad m_n = 1{,}008\,665\,0\,\text{u}$
$\quad m_e = 5{,}485\,799\,1 \cdot 10^{-4}\,\text{u}$

Kaavoja ja muuntokertoimia / Formler och omvandlingsfaktorer

$0\,°\text{C} = 273{,}15\,\text{K}$
$1\,\text{atm} = 101\,325\,\text{Pa}$
$1\,\text{eV} \approx 1{,}602 \cdot 10^{-19}\,\text{J}$

$1\,\text{kWh} = 3{,}6\,\text{MJ}$
$360° = 2\pi\,\text{rad}$
$\ln 2 \approx 0{,}693$

$A = 4\pi r^2; V = \dfrac{4}{3}\pi r^3$

$ax^2 + bx + c = 0 \Rightarrow x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$\cos x = \sin(90° - x), 0 \leq x \leq 90°$

$\cos^2 x + \sin^2 x = 1$

Kemia / Kemi

$It = nzF$

$pV = nRT$

$K_a = \dfrac{[\text{A}^-][\text{H}_3\text{O}^+]}{[\text{HA}]}$

$\text{pH} = \text{pK}_a + \lg \dfrac{[\text{A}^-]}{[\text{HA}]}$

Fysiikka / Fysik

$v = v_0 + at$

$s = v_0 t + \dfrac{1}{2}at^2$

$v = \omega r$

$T = \dfrac{2\pi}{\omega}; \ f_n = \dfrac{n}{t} = \dfrac{1}{T}$

$\omega = \omega_0 + \alpha t$

$\varphi = \varphi_0 + \omega_0 t + \dfrac{1}{2}\alpha t^2$

$a = \dfrac{v^2}{r}$

$F = G\dfrac{m_1 m_2}{r^2}, \ E_p = -\dfrac{Gm_1 m_2}{r}$

$F = -kx; \ \dfrac{F}{A} = E\dfrac{\Delta l}{l}$

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

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

$$\Delta\overline{p} = \overline{I} = \overline{F}\Delta t$$

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

$$F_\mu = \mu N$$

$$l = l_0(1 + \alpha\Delta T);\ V = V_0(1 + \gamma\Delta T)$$

$$\eta = \frac{W_o}{W_i} = \frac{\dfrac{W_o}{t}}{\dfrac{W_i}{t}} = \frac{P_o}{P_i}$$

$$\Delta Q = cm\Delta T$$

$$Q = sm$$

$$Q = rm$$

$$\mu_{\max} = 1 - \frac{T_2}{T_1}$$

$$F = \frac{Q_1 Q_2}{4\pi\varepsilon_0 r^2}$$

$$F = qE$$

$$V(x_0) = E_0/q$$

$$E_{\text{pot}} = qU$$

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

$$C = Q/U$$

$$C = \varepsilon_r\varepsilon_0\frac{A}{d}$$

$$E = \frac{1}{2}QU$$

$$U = RI,\ P = UI,\ R = \rho\frac{\ell}{A}$$

$$E = hf = \frac{hc}{\lambda};\ E(\text{eV}) = 1240/\lambda(\text{nm})$$

$$I = I_0 e^{-\mu x}$$

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

$$P = W/t$$

$$E_p = mgh;\ E_k = \frac{1}{2}mv^2$$

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

$$p = \frac{F}{A} = \frac{Fs}{As} = \frac{W}{V}$$

$$p = \rho gh$$

$$f = f_0\frac{v}{v\pm v_l};\ f = f_0\frac{v\pm v_h}{v}$$

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

$$L = 10\lg\left(\frac{I}{I_0}\right)\text{dB}$$

$$\frac{\sin\alpha_1}{\sin\alpha_2} = \frac{\lambda_1}{\lambda_2} = \frac{v_1}{v_2} = \frac{n_2}{n_1} = n_{12}$$

$$L = I/A$$

$$\Delta Q = I\cdot\Delta t$$

$$B = \frac{\mu_0 I}{2\pi r}$$

$$\overline{F} = q(\overline{v}\times\overline{B});\ F = qvB\sin\alpha$$

$$F_m = IlB\sin\alpha$$

$$\Phi = AB\cos\alpha$$

$$e = NAB\omega\sin(\omega t)$$

$$e_k = -\frac{\Delta\Phi}{\Delta t}$$

$$M = NABI\sin\alpha$$

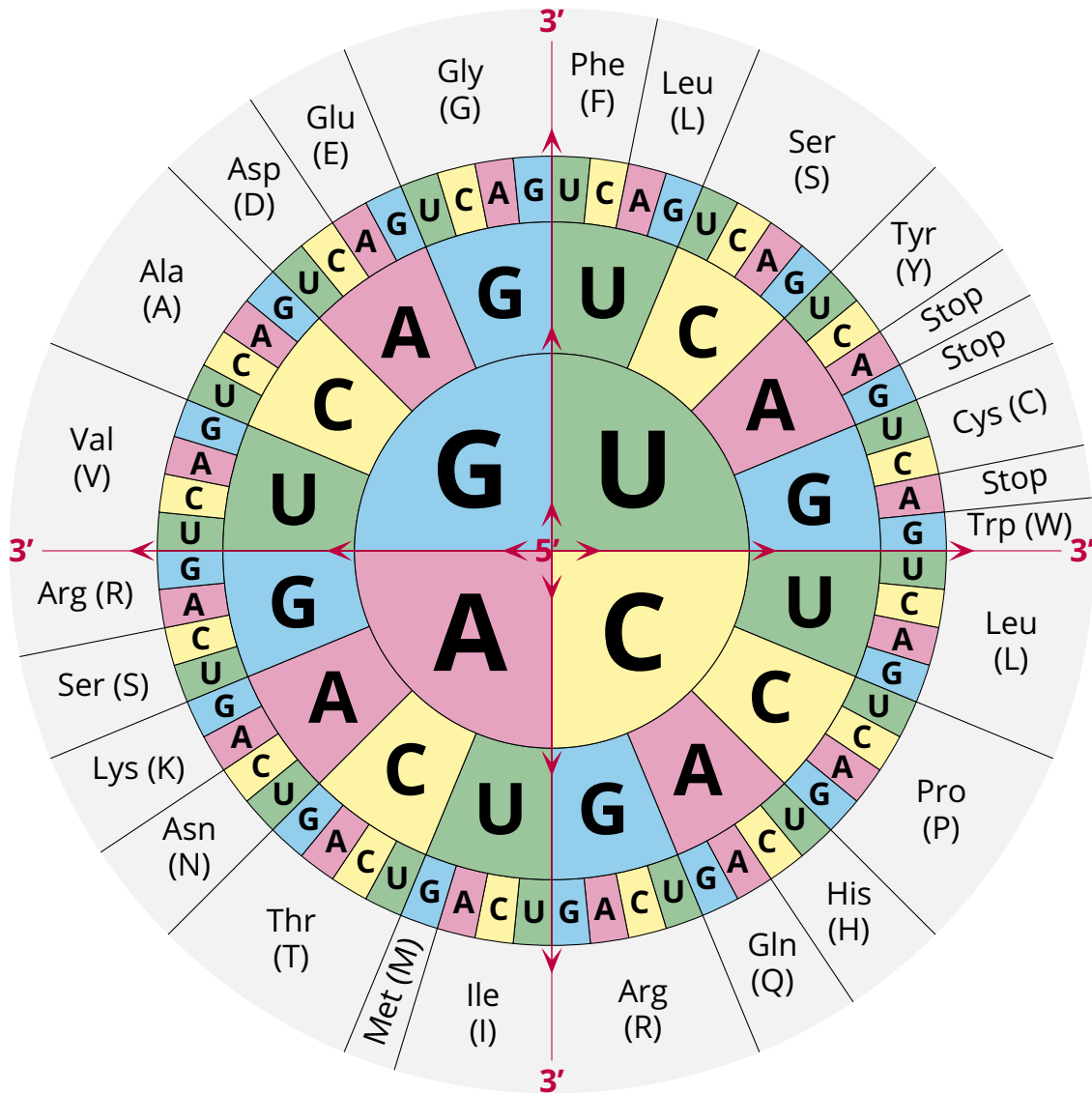$$\frac{U_1}{U_2} = \frac{N_1}{N_2} \approx \frac{I_2}{I_1}$$

$$2d\sin(\theta) = n\lambda$$

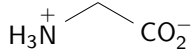$$\frac{1}{\lambda} = R_H\left(\frac{1}{n^2} - \frac{1}{m^2}\right)$$

$$N = \frac{m}{M}N_A$$

$$A = \lambda N = \lambda N_0 e^{-\lambda t} = A_0 e^{-\lambda t}$$

Lähetti-RNA:n kodoneja vastaavat aminohapot
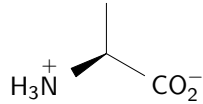## Aminosyror som motsvarar kodon i budbärar-RNA

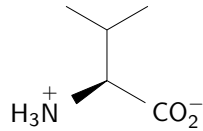# Luonnon aminohapot / Aminosyrorna i naturen

Aminohapot on esitetty siinä muodossa, jossa ne pääosin esiintyvät fysiologisessa pH-arvossa $7,4$.
Aminosyrorna presenteras i den form som mest förekommer vid det fysiologiska pH-värdet $7,4$.
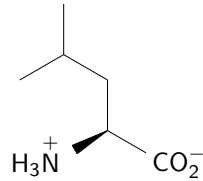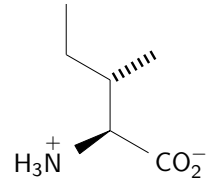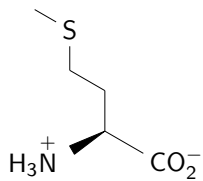
**glysiini /
glycin**
Gly, G

**alaniini /
alanin**
Ala, A

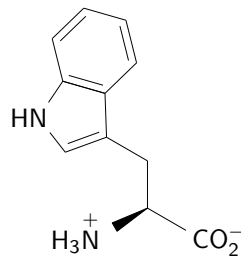**valiini /
valin**
Val, V

**leusiini /
leucin**
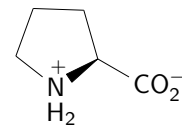Leu, L

**isoleusiini /
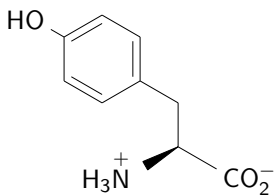isoleucin**
Ile, I

**metioniini /
metionin**
Met, M

**fenyylialaniini /
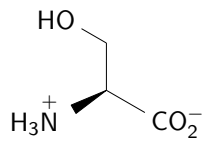fenylalanin**
Phe, F
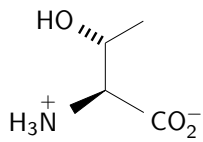
**tryptofaani /
tryptofan**
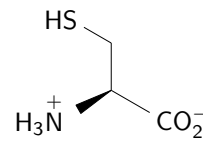Trp, W

**proliini /
prolin**
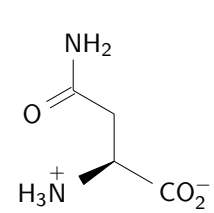Pro, P

**tyrosiini /
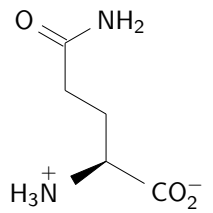tyrosin**
Tyr, Y

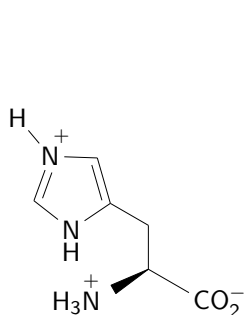**seriini /
serin**
Ser, S

**treoniini /
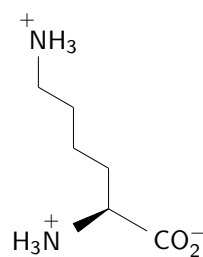treonin**
Thr, T

**kysteiini /
cystein**
Cys, C

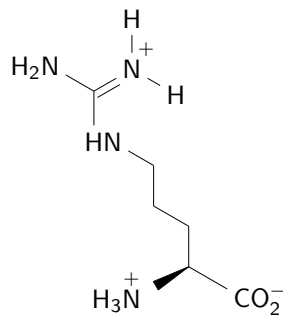**asparagiini /
asparagin**
Asn, N
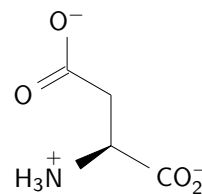
**glutamiini /
glutamin**
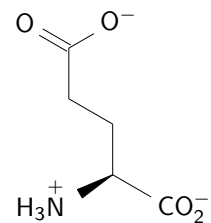Gln, Q

**histidiini /
histidin**
His, H

**lysiini /
lysin**
Lys, K

**arginiini /
arginin**
Arg, R

**asparagiinihappo /
asparaginsyra**
Asp, D

**glutamiinihappo /
glutaminsyra**
Glu, E

Alkuaineiden jaksollinen järjestelmä / Grundämnenas periodiska system

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

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