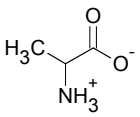
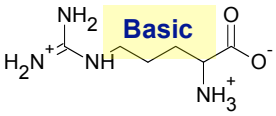
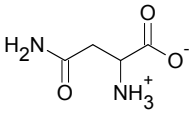
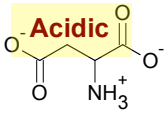
Amino acids (at pH 7.4 with most of the Carbon and Hydrogen atoms not labelled) Premed411.com


Ala (A) 89

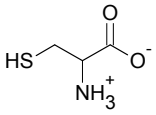


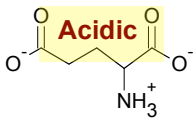
Arg (R) 174


Asn (N) 132

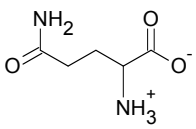


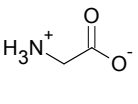
Asp (D) 133

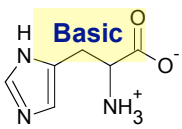

Cys (C) 121



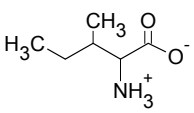
Glu (E) 147

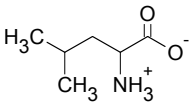

Gln (Q) 146

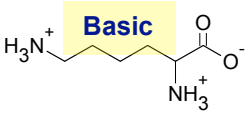

Gly (G) 75



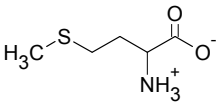
His (H) 155

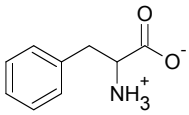

Ile (I) 131

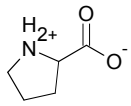

Leu (L) 131

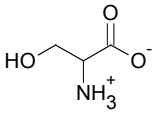


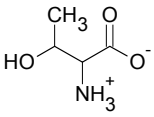
Lys (K) 146

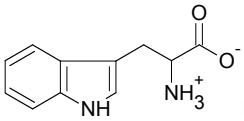

Met (M) 149

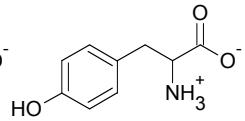

Phe (F) 165

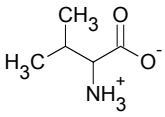

Pro (P) 115


Ser (S) 105

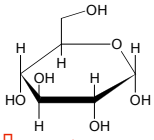

Thr (T) 119

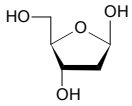

Trp (W) 204

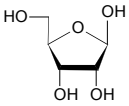

Tyr (Y) 181

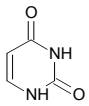

Val (V) 117

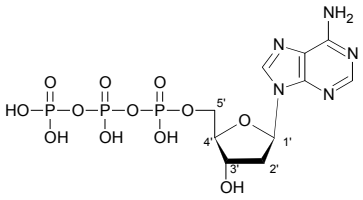
Sugars and Bases

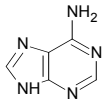

-D-Glucopyranose

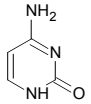

Deoxyribose

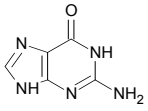

Ribose

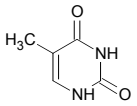

Uracil


ATP


Adenine


Cytosine


Guanine


Thymine

Henderson-Hasselbalch equation $pH=pKa + \log[A^-]/[HA]$

Free energy change of a reaction

$$A + B \underset{}{\overset{K_{eg}}{\rightleftharpoons}} C + D$$

$\Delta G=\Delta G^o + RT\ln[C][D]/[A][B]$ $\Delta G^o=-RT\ln K_{eg}$ $\Delta G=\Delta H - T\Delta S$

Arrhenius equation: $k=Ae^{-\Delta G‡/RT}$ $[S^‡]=[S]\, e^{-\Delta G‡/RT}$ $V=k[S]\, e^{-\Delta G‡/RT}$

! **Michaelis- Menten** $V=k_2[E_T][S]/(K_m + [S])$ or $V=V_{max}[S]/(K_m + [S])$

! **Linweaver- Burk** $1/V=K_m/(V_{max}\cdot[S]) + 1/V_{max}$ $K_m=(k_2+k_{-1})/k_1$

Effects of inhibition on K_m and V_{max}

Inhibition	Rate equation	Apparent K_m	Apparent V_{max}
! None	$V=V_{max}[S]/(K_m+[S])$	K_m	V_{max}
! Competitive	$V=V_{max}[S]/(K_m(1+[I]/K_I)+[S])$	$K_m(1+[I]/K_I)$	V_{max}
! Non-competitive	$V=V_{max}[S]/(1+[I]/K_I)(K_m+[S])$	K_m	$V_{max}/(1+[I]/K_I)$

Amino Acid	α-Carboxyl	α-NH3	R group
Alanine (A)	2.3	9.9	
Arginine (R	1.8	9.0	12.5
Asparagine (N)	2.0	8.8	
Aspartic acid (D)	2.0	9.8	3.9
Cysteine (C)	1.8	10.8	8.3(SH)
Glutamic acid (E)	2.2	9.7	4.3
Glutamine (Q)	2.2	9.1	
Glycine (G)	2.3	9.8	
Histidine (H)	1.8	9.2	6.0(IMI)
Isoleucine (I)	2.4	9.7	
Leucine (L)	2.4	9.6	
Lysine (K)	2.2	9.0	10.8
Methionine (M)	2.3	9.2	
Phenylalanine (F)	1.8	9.1	
Proline (P)	2.1	10.6	
Serine (S)	2.1	9.2	13(OH)
Threonine (T)	2.6	10.4	13(OH)
Tryptophan (W)	2.4	9.4	
Tyrosine (Y)	2.2	9.1	10.9(OH)
Valine (V)	2.3	9.6	

pKas

PHYSICAL CONSTANTS AND CONVERSION OF UNITS

Values of physical constants

Physical constant	Symbol	Value
Atomic mass unit (dalton)	amu	1.661×10^{-24} g
Avogadro's number	N	6.022×10^{23} mol^{-1}
Boltzmann' constant	k	1.381×10^{-23} J deg^{-1}
		$3{,}298 \times 10^{-24}$ cal deg^{-1}
Electron volt	eV	1.602×10^{-19} J
		3.828×10^{-20} cal
Faraday constant	F	9.649×10^{4} C mol^{-1}
		2.306×10^{4} cal volt^{-1} eq^{-1}
Curie	Ci	3.70×10^{10} disintegrations sec^{-1}
Gas constant	R	8.314 J mol^{-1} deg^{-1}
		1.987 cal mol^{-1} deg^{-1}
Planck's constant	h	6.626×10^{-34} J sec
		1.584×10^{-34} cal sec
Speed of light in a vacuum	c	2.998×10^{10} cm sec^{-1}

Abbreviations: C, coulomb; cal, calorie; cm, centimeter; deg, degree Kelvin; eq, equivalent; g, gram; J, joule; mol, mole; sec, second

Conversion Factors

Physical quantity	Equivalent
Length	1cm = 10^{-2}m = 10 mm = 10^{4}µm = 10^{7} nm
	1cm = 10^{8} Å = 0.3937 inch
Mass	1g = 10^{-3} kg = 10^{3} mg = 10^{6} µg
	1g = 3.527×10^{-2} ounce (avoirdupoir)
Volume	1 cm^3 = 10^{-6}m^3 = 10^{3} mm^3
	1 ml = 1 cm^3 = 10-^{3}l = 10^{3} µl
	1 cm^3 = 6.1×10^{-2} in^3 = 3.53×10^{-5} ft^3
Temperature	K = °C + 273.15
	°C = 5/9 (°F – 32)
Energy	1 J = 10^{7} erg = 0.239 cal = 1 watt sec
Pressure	1 torr = 1 mm Hg (0°C)
	= 1.333×10^{2} newton/m^2
	= 1.333×10^{2} pascal
	= 1.316×10^{-3} atmospheres

Mathematical constants

π = 3.14159
e = 2.71828
$\log_e x = 2.303 \log_{10} x$

Standard prefixes

Prefix	Symbol	Factor
kilo	k	10^{3}
hecto	h	10^{2}
deca	da	10^{1}
deci	d	10^{-1}
centi	c	10^{-2}
milli	m	10^{-3}
micro	µ	10^{-6}
nano	n	10^{-9}
pico	p	10^{-12}

$\Delta G' = RT \ln([C_2]/[C_1]) + ZF\Delta\Psi$ $\quad \Delta G^{\circ\prime} = -nF\Delta E^{\circ\prime}$ $\quad \Delta G^{\circ\prime} = -RT\ln K$

$E' = E^{\circ\prime} + (RT/nF)\ln([ox]/[red])$ $\quad S = (4Dt)^{1/2}$

Molecular masses: H=1 C=12 N=14 O=16 P=31 S=32

$Y = pO_2^n/(pO_2 + P_{50})^n$ Hill equation $Y/(1-Y) = pO_2^n/P_{50}^n$ $\log Y/(1-Y) = n \log pO_2 - n \log P_{50}$

n=1 for myoglobin and 2.8 for hemoglobin

TABLE 29.3 Allowed pairings at the third base of the codon according to the wobble hypothesis

First base of anticodon	Third base of codon
C	G
A	U
U	A or G
G	U or C
I	U, C, or A

To be N-glycosolated:
N-X-(S/T)
Asn—Anything—(Ser or Thr)

FIRST LETTER	SECOND LETTER: U	SECOND LETTER: C	SECOND LETTER: A	SECOND LETTER: G	THIRD LETTER
U	UUU Phe	UCU Ser	UAU Tyr	UGU Cys	U
	UUC Phe	UCC Ser	UAC Tyr	UGC Cys	C
	UUA Leu	UCA Ser	UAA STOP	UGA STOP	A
	UUG Leu	UCG Ser	UAG STOP	UGG Trp	G
C	CUU Leu	CCU Pro	CAU His	CGU Arg	U
	CUC Leu	CCC Pro	CAC His	CGC Arg	C
	CUA Leu	CCA Pro	CAA Gln	CGA Arg	A
	CUG Leu	CCG Pro	CAG Gln	CGG Arg	G
A	AUU Ile	ACU Thr	AAU Asn	AGU Ser	U
	AUC Ile	ACC Thr	AAC Asn	AGC Ser	C
	AUA Ile	ACA Thr	AAA Lys	AGA Arg	A
	AUG Met	ACG Thr	AAG Lys	AGG Arg	G
G	GUU Val	GCU Ala	GAU Asp	GGU Gly	U
	GUC Val	GCC Ala	GAC Asp	GGC Gly	C
	GUA Val	GCA Ala	GAA Glu	GGA Gly	A
	GUG Val	GCG Ala	GAG Glu	GGG Gly	G