SI Unit Conversion Guide

CONSTITUENT	FLUID	CONVERSION TRAD <--> SI --> MULT DIV <---	NOMOGRAM PAGE #
Acid Phosphatase	serum	1	
ACTH (adrenocorticotropin)	serum	0.2202	13
Alanine Aminotransferase (ALT) same as SGPT	serum	1	
Albumin	serum	10	14
Aldolase	serum	1	
Alkaline Phosphatase	serum	1	
Ammonia (as NH3)	plasma	0.5872	15
Amylase	serum	1	
Aspartate Aminotransferase (AST) same as SGOT	serum	1	
Bilirubin (Total or Conjugated)	serum	17.1	16
Calcium	serum	0.25	17
Calcium, Ionized	serum	0.25	17
Carbon Dioxide	wh bld, plsm, ser	1	32
Chloride	plasma, serum	1	
Cholesterol	plasma, serum	0.02586	18
Complement C3	serum	0.01	19
Complement C4	serum	0.01	20
Cortisol	plasma, serum	27.59	21
Cortisol, Free	urine	2.759	22
Creatinine	plasma, serum	88.4	23
Creatinine	urine	8.84	24
Creatinine Clearance	serum & urine	0.01667	25
Creatine Kinase	serum	1	
Diazepam	plasma, serum	3512	26
Digoxin	serum	1.281	27
Dilantin (Phenytoin)	plasma, serum	3.964	28
Estradiol	plasma, serum	3.671	29
Ethanol	plasma, serum	0.2171	30
Ferritin	plasma, serum	1	
Fibrin(ogen) Split Products (FSP, FDP)	serum	1	
Folate	serum	2.266	31
Follicle Stimulating Hormone (FSH)	plsm, ser, urine	1	
Gases (pO2 & CO2)	arterial wh bld	0.1333	32
Glucose	plasma, serum	0.05551	33

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SI Unit Conversion Guide

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CONTENTS

Commonly Used Conversion Factors . . . . . **Front & Back Cover**

Section I: Overview of SI Units 1

Section II: Conversion Nomograms 11
- Adrenocorticotropin (ACTH) 13
- Albumin 14
- Ammonia (as NH_3) 15
- Bilirubin 16
- Calcium 17
- Cholesterol 18
- Complement C3 19
- Complement C4 20
- Cortisol 21
- Cortisol, Free 22
- Creatinine, plasma, serum 23
- Creatinine, urine 24
- Creatinine Clearance 25
- Diazepam 26
- Digoxin 27
- Dilantin (Phenytoin) 28
- Estradiol 29
- Ethanol 30

Folate 31
Gases (pCO_2 & pO_2) 32
Glucose 33
Hematocrit 34
Hemoglobin 35
Immunoglobulins 36
Iron & Iron Binding Capacity 37
Magnesium 38
N-acetylprocainamide 39
Phenobarbital 40
Phosphate 41
Procainamide 42
Progesterone 43
Protein, Total 44
T_3 Uptake 45
Testosterone 46
Theophylline 47
Thyroxine 48
Transferrin 49
Triglycerides 50
Urea Nitrogen 51
Uric Acid 52

Section III: Conversion Tables 53

INTRODUCTION

SI UNITS

This three-part handbook will help ease your transition to the International System of Units (SI) and will serve as a useful reference once you're comfortable with the system. Section I presents an overview of SI, describing its units, nomenclature, and usage. Section II contains detailed nomograms for some of the more common constituents, which allow for quick conversion between traditional and SI units. Section III consists of a comprehensive conversion table for measurement of over 500 constituents.

SECTION I

OVERVIEW OF SI UNITS

There are several rationales for the use of SI units by the international scientific community. The use of a single system of measurement will improve the comparability of test results between countries (governments representing 98 percent of the world's population are committed to using the SI system). In addition, many journals have now adopted SI units to eliminate the awkwardness of reporting in two different systems of measurement. Quantitating the amount of a substance in moles (SI units) rather than in grams (traditional units) may also confer a scientific advantage, allowing for an easier understanding of molecular relationships. However, had such an advantage been overwhelming, the adoption of SI units would likely have occurred spontaneously.

PHYSICAL QUANTITY MEASURED	BASE UNIT	SI ABBREVIATION
Amount of Substance	mole	mol
Length	meter	m
Mass	kilogram	kg
Time	second	s
Thermodynamic Temperature	kelvin	K
Electric Current	ampere	A
Luminous Intensity	candela	cd

There are seven fundamental or base SI units.

The major effect of adopting SI units will be the change from mass units (gram) to molecular units (mole).

Although the second is the official time unit of the SI system, the units of minute, hour, and day can be used to avoid uninterpretable values in kiloseconds.

The degree Celsius is also acceptable for measuring temperature since the change to kelvin would be very noticeable and, although they differ in their zero points, the kelvin and Celsius scales have equivalent temperature intervals.

Further representative units derived from the seven base SI units are listed on the next page.

PHYSICAL QUANTITY MEASURED	SI UNIT	SYMBOL	DERIVATION FROM BASE UNITS
Area	square meter	m^2	m^2
Volume	cubic meter	m^3	m^3
Force	newton	N	$kg \cdot m/s^2$
Pressure	pascal	Pa	$kg/(m \cdot s^2) = N/m^2$
Work Energy	joule	J	$kg \cdot m^2/s^2 = N \cdot m$
Density	kilogram per cubic meter	kg/m^3	kg/m^3
Frequency	hertz	Hz	s^{-1}
Power	watt	W	J/s
Electrical Potential	volt	V	W/A
Electric Charge	coulomb	C	$A \cdot s$
Electrical Capacitance	farad	F	$A \cdot s/V = C/V$
Inductance	henry	H	$V \cdot s/A$

SPECIAL CONSIDERATIONS

The SI unit of volume is the liter; it is the equivalent of the cubic decimeter and is therefore derived from the base SI unit of length.

Pressure is a force acting on a given area. The SI unit of pressure is the pascal, which is equivalent to 1 newton (the SI unit

of force) acting on an area of 1 square meter. At present, there is limited worldwide use of the pascal or kilopascal for measuring blood pressure, CSF pressure, intraocular pressure, partial pressure of blood gases, or compressed gases for anesthesia. The use of the pascal would change 100 mm Hg of blood pressure to 13.3 kilopascals. The table in this booklet includes the infrequently used conversion factor that relates mm Hg to kilopascals.

The joule is the SI unit that could replace the non-SI calorie in the measurement of work energy. However, the future use of joules in place of calories in clinical practice cannot now be predicted.

Nomenclature & Style Specifications in the SI System

GENERAL RULES

In the SI system lowercase letters should be used for symbols (use mol, not Mol). However, there are exceptions to this general rule. An uppercase "L" represents the liter to prevent confusion between a lowercase "l" and the number "1." Also, when the unit derives from a proper name, the first letter of the symbol is capitalized. For example, Pa is the abbreviation for pascal rather than pa. When the proper name is written in full, however, not even the first letter is capitalized (e.g., pascal) except for Celsius which is capitalized in both its abbreviated and full-length forms.

A symbol is not followed by a period unless it is at the end of a sentence (use mol, not mol.), and symbols are not pluralized (use kg, not kgs). When a number precedes an SI unit, the unit symbol should be used rather than the full name of the unit (use 500 m, not 500 meters).

When SI symbols are used as part of an expression, multiplication is indicated by a dot (·) rather than an "x" sign, and division is represented by a solidus (/). Only one solidus is included in each expression. For example, mmol/(L · s) is used rather than mmol/L/s. Expressions with more than one SI unit should be consistent; either all the unit names should be spelled out completely or all should be abbreviated by symbols.

Percentage values in SI are represented as a fraction of one. For example, a hematocrit of 40% is reported as 0.40.

DECIMAL MULTIPLES & SUBMULTIPLES OF SI UNITS

Multiple	Prefix	Symbol
10^{12}	tetra	T
10^{9}	giga	G
10^{6}	mega	M
10^{3}	kilo	k
Submultiple	**Prefix**	**Symbol**
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n
10^{-12}	pico	p
10^{-15}	femto	f
10^{-18}	atto	a

SUGGESTED INCREMENTS AND SIGNIFICANT FIGURES

In an effort not to imply greater analytical precision in SI units than exists in traditional units, this booklet offers recommendations on significant digits and suggested minimum increments for each constituent.

Laboratory Values with Special Considerations

pH

There has been an effort to report hydrogen ion concentration in nmol/L rather than in pH units, but the use of this terminology has not been widely supported. The pH scale will therefore be used to measure hydrogen ion concentration.

OSMOLALITY

With strict application of SI units, osmolality would be reported as the depression of the freezing point in degrees Celsius. Present measurement is in osmoles, where 1 mole of an "ideal" solute in a kilogram of water (which depresses the water's freezing point by 1.858°C) represents an osmolality of 1 Osm. Since body fluids are dilute solutions, it is more convenient to express their osmolality in terms of milliosmoles. The traditional value in mOsm/kg may be reported in SI units as mmol/kg, but replacing it with the number of degrees Celsius that the freezing point has been depressed is unlikely.

CELL COUNTS IN HEMATOLOGY

The SI unit of volume for cell counts is the liter. Thus, values for cell counts expressed per mm^3 (equivalent to 1 μL or 10^{-6} L) are reported for a volume 10^6 times larger in SI units than in traditional units. The numbers preceding the unit volume, often the only numbers mentioned in verbal communication of cell counts, are not changed in SI units. Therefore, in practice this particular change may often go unnoticed. Examples: a platelet count of $150 \cdot 10^3/mm^3$ becomes $150 \cdot 10^9/L$; a leukocyte count of $4.5 \cdot 10^3/mm^3$ becomes $4.5 \cdot 10^9/L$.

HEMOGLOBIN

The value for hemoglobin has been traditionally expressed in mass concentration as g/dL. In SI units, this will change, and hemoglobin will be reported as either mass concentration in g/L (since the liter is the SI volume unit) or as substance concentration in mmol/L. The substance concentration could be reported as mmol/L of the hemoglobin monomer or mmol/L of the hemoglobin tetramer; the International Committee for Standardization in Hematology favors the monomer concept. However, the substance concentration measurement in mmol/L is confounded by the fact that not all circulating hemoglobin carries oxygen (a small percentage of hemoglobin is carboxyhemoglobin, sulfhemoglobin, or methemoglobin). The conversion factor used in this booklet to derive the substance concentration of hemoglobin is based upon the molecular weight of the hemoglobin monomer. Despite support for reporting hemoglobin in mmol/L, reporting in g/L is recommended.

DRUGS

Not all drug concentrations can be expressed in molar SI units because a number of pharmaceutical compounds are mixtures of biologically active substances and, therefore, have no specific molecular weight. For example, heparin molecules range in molecular weight from 5000 to 50,000. Since drugs are not prescribed in molar doses in any country, expressing drug concentrations in molar SI units, even when possible, would make simple pharmacokinetic calculations more difficult.

ENZYMES

The most appropriate SI unit for reporting enzyme activity is a matter of significant debate. One option is to continue reporting in the widely used International Units of enzyme activity where 1 unit equals the amount of enzyme generating 1 μmol of product per minute. A second option is to use the SI-derived unit, the katal, which reports product formation in moles per second (both moles and seconds are base SI units). Both reporting options are included in this handbook.

For nearly all enzymes included in the table, there is a factor of 0.01667 to convert International Units/L, which is μmol/minute per liter, to μkat/L, which is μmol/s per liter. The 0.01667 factor is the reciprocal of 60 and corrects for the difference in time interval. It is, therefore, independent of enzyme molecular weight.

There are multiple methods for measuring many of the enzyme activities included in the table. The units are often described by specific name; for example, AST (SGOT) can be expressed in Sigma-Frankel units as well as International Units. No attempt has

been made to include any units in this book other than International Units.

Finally, enzyme assays are not uniformly performed at 37°C; they may be performed at 30°C or 25°C. This lower temperature of incubation may or may not reduce the amount of enzyme activity observed. Thus, the normal range for an assay run at 30°C may be lower or somewhat similar to the normal range for an enzyme assay run at 37°C. The temperatures of the enzyme assays and the associated normal ranges are stated in the conversion table.

Section II

SI UNIT CONVERSION NOMOGRAMS

To convert between SI units and traditional units at a glance and limit the need for mathematical calculations, conversion nomograms for the more common constituents are included in this section. Many constituents have a conversion factor of 1 and are excluded from this section. They can be found, however, in Section III and in the table on the inside front and back covers of this handbook.

Because it is easier to read from left to right, nomograms are presented in pairs. The nomogram on the left side of the page shows traditional to SI unit conversions, with the appropriate multiplication factor in the heading. The nomogram on the right side of the page is for SI to traditional unit conversions. The multiplication factor for the nomogram on the right side of the page is the reciprocal of the factor for the nomogram on the left side of the page.

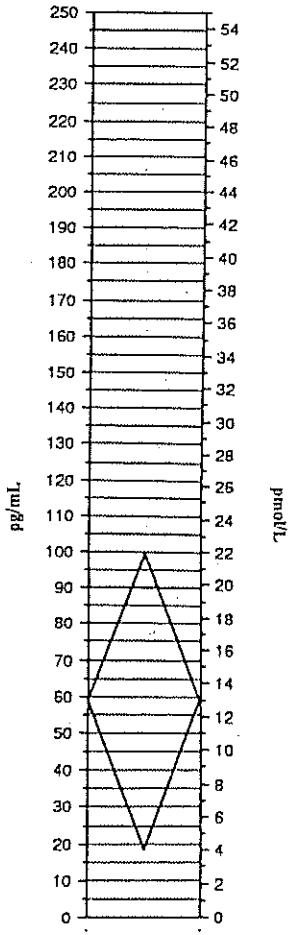
Example:
Nomogram on left: Multiplication Factor = 0.01
Nomogram on right: Multiplication Factor = 100 = 1/0.01

The large conversion table in Section III provides only one conversion factor, along with instructions to multiply by this factor to convert from traditional to SI units and to divide by this factor to convert from SI to traditional units.

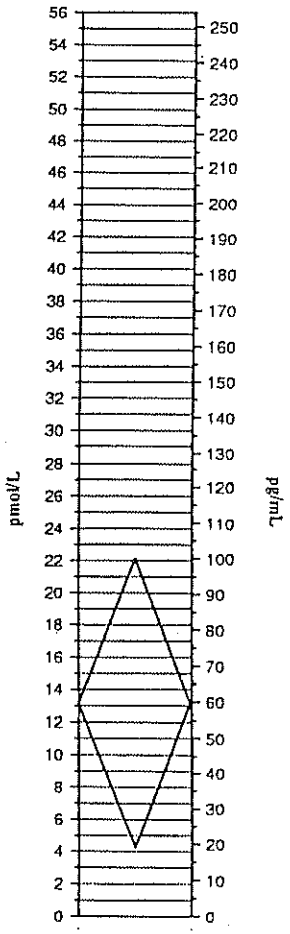
On each nomogram, the many parallel lines, the large number

of intervals, and the wide range of values make most conversions possible at a glance and thereby avoid the need for a ruler. A diamond inclusive of the normal range is included in all nomograms that have a single normal range. If there are multiple normal ranges due to age, sex, or different forms of a compound (examples: ionized and total calcium, conjugated and total bilirubin), the different normal ranges are listed below the pair of nomograms. The normal ranges in the nomograms should be used for adult patients only.

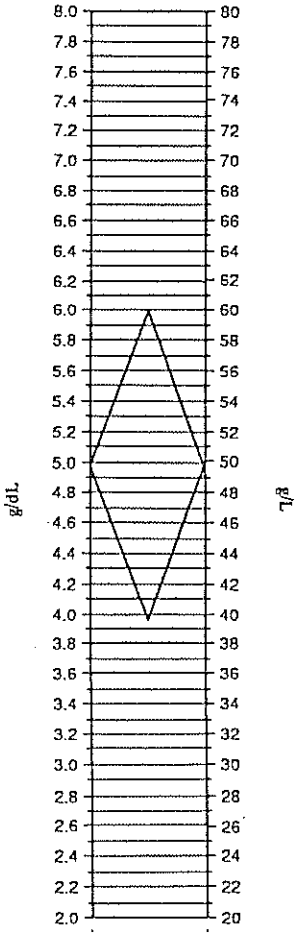
Adrenocorticotropin - plasma
Multiplication Factor = 0.2202
Traditional → SI



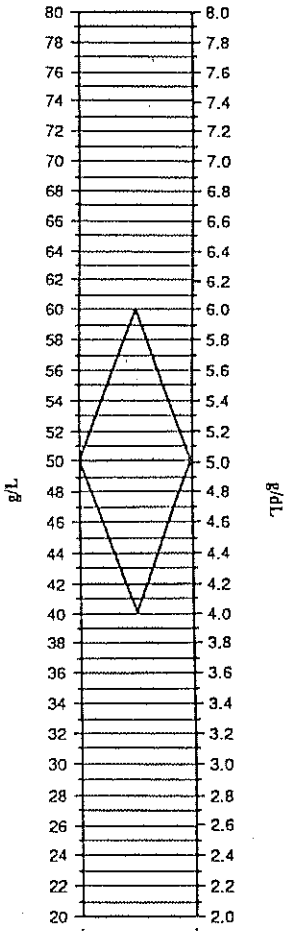
Adrenocorticotropin - plasma
Multiplication Factor = 4.541
SI → Traditional



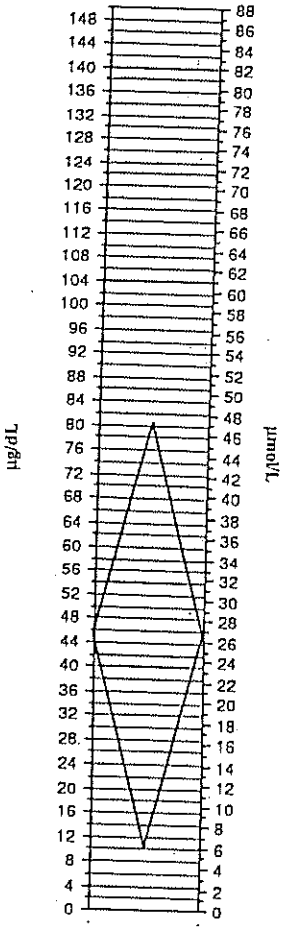
Albumin - serum
Multiplication Factor = 10
Traditional → SI



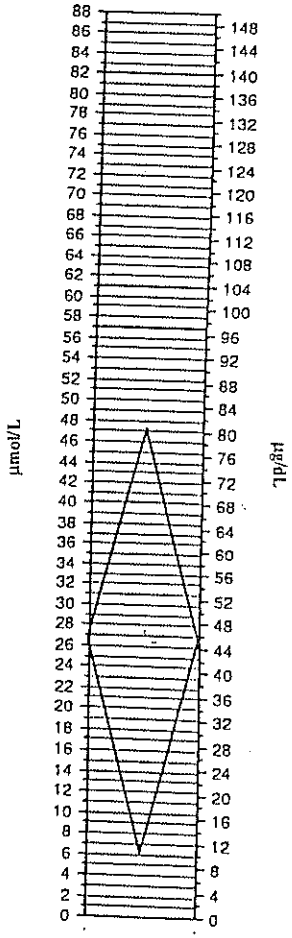
Albumin - serum
Multiplication Factor = 0.1
SI → Traditional



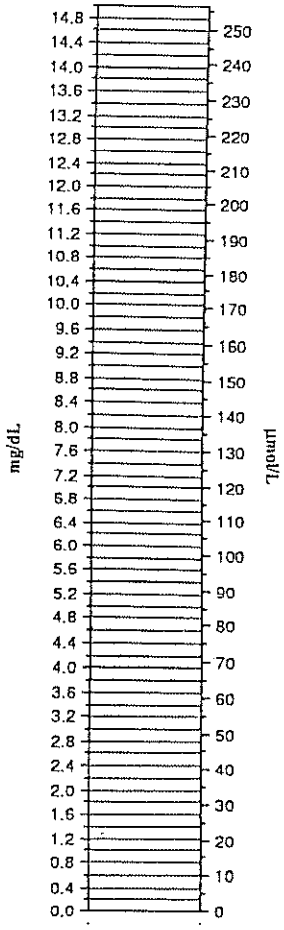
Ammonia as NH3 - plasma
Multiplication Factor = 0.5872
Traditional → SI



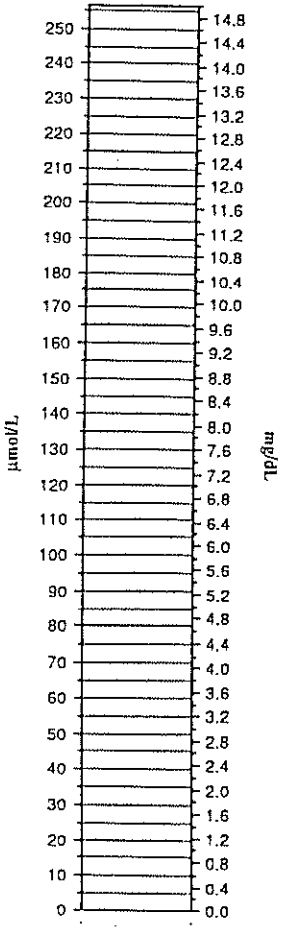
Ammonia as NH3 - plasma
Multiplication Factor = 1.703
SI → Traditional



Bilirubin - serum
Multiplication Factor = 17.1
Traditional → SI

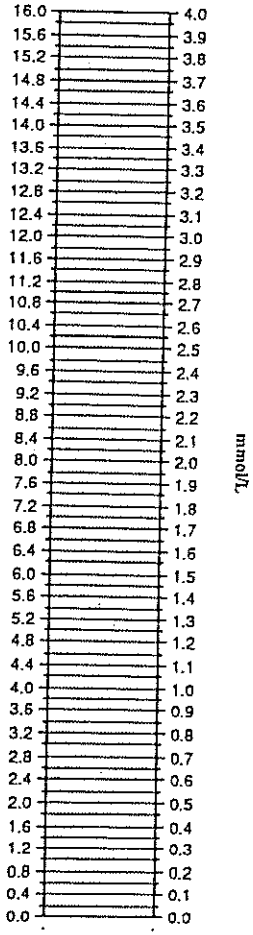


Bilirubin - serum
Multiplication Factor = 0.0585
SI → Traditional

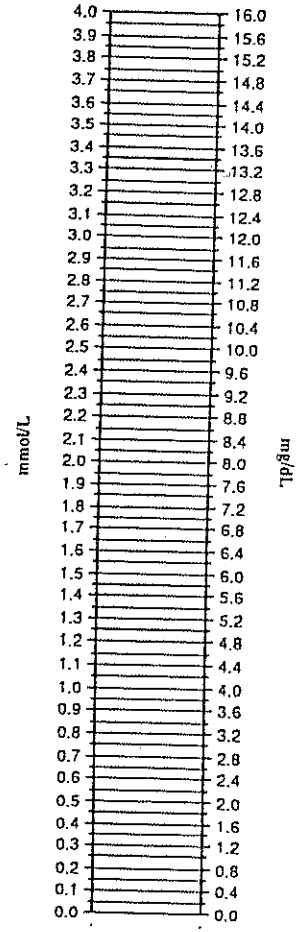


Normal Ranges	Traditional	SI
Total	0.1 - 1.0	2 - 18
Conjugated	0 - 0.2	0 - 4

Calcium & Ionized Calcium - serum
Multiplication Factor = 0.250
Traditional → SI



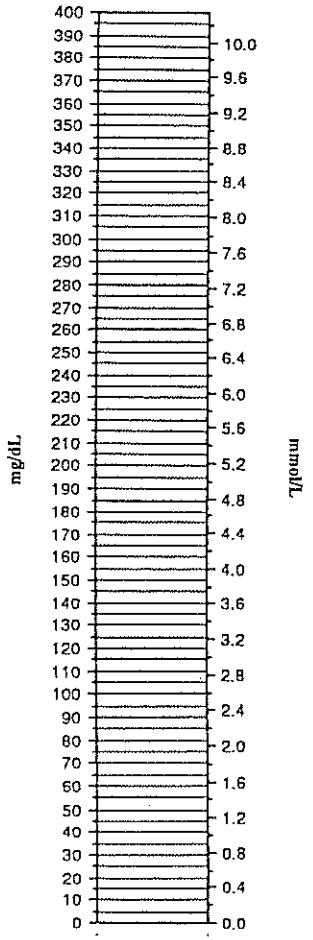
Calcium & Ionized Calcium - serum
Multiplication Factor = 4
SI → Traditional



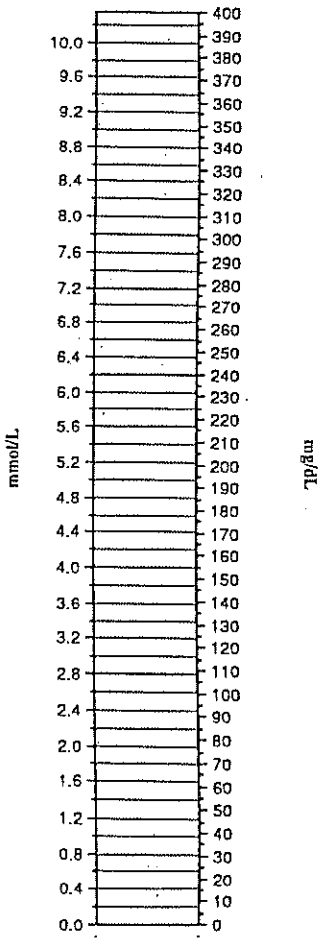
Normal Ranges	Traditional	SI
Calcium		
Male	8.8 - 10.3	2.20 - 2.58
Female < 50 yr	8.8 - 10.0	2.20 - 2.50
Female > 50 yr	8.8 - 10.2	2.20 - 2.56
Calcium, Ionized	4.00 - 4.60	1.00 - 1.15

mmol.

Cholesterol - plasma, serum
Multiplication Factor = 0.02586
Traditional → SI

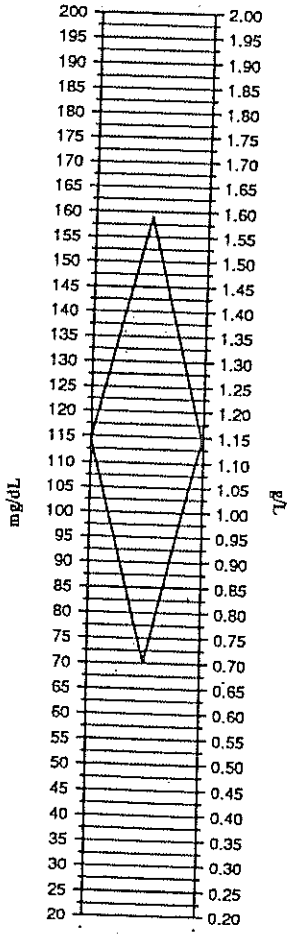


Cholesterol - plasma, serum
Multiplication Factor = 38.67
SI → Traditional

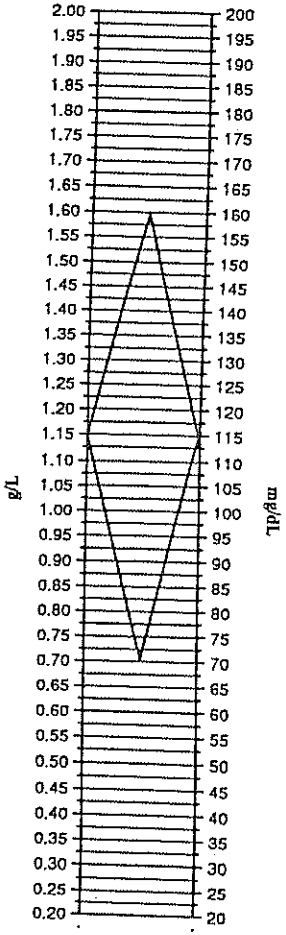


Normal Ranges	Traditional	SI
HDL		
Male	30 - 70	0.80 - 1.80
Female	30 - 90	0.80 - 2.35
LDL	50 - 190	1.30 - 4.90
Total Cholesterol		
< 29 yr	< 200	< 5.20
30 - 39 yr	< 225	< 5.85
40 - 49 yr	< 245	< 6.35
> 50 yr	< 265	< 6.85

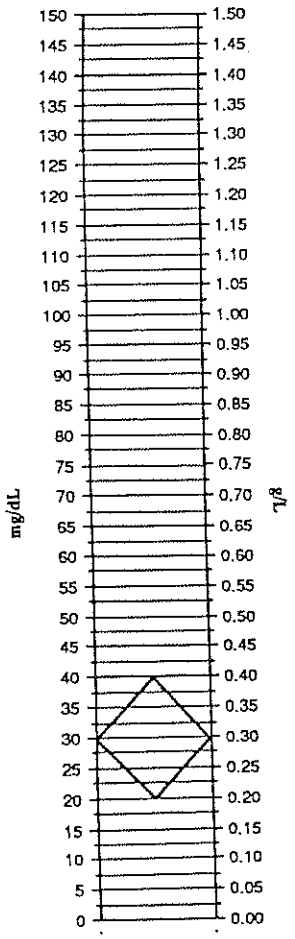
Complement Component 3 - serum
Multiplication Factor = 0.01
Traditional → SI



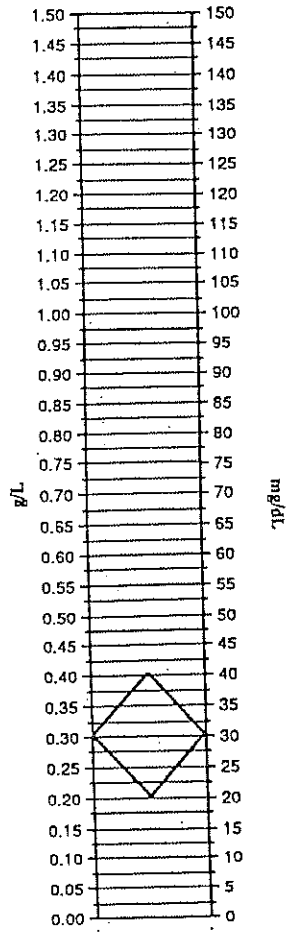
Complement Component 3 - serum
Multiplication Factor = 100
SI → Traditional



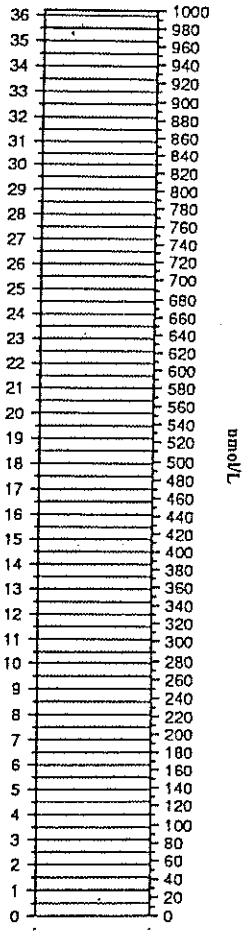
Complement Component 4 - serum
Multiplication Factor = 0.01
Traditional → SI



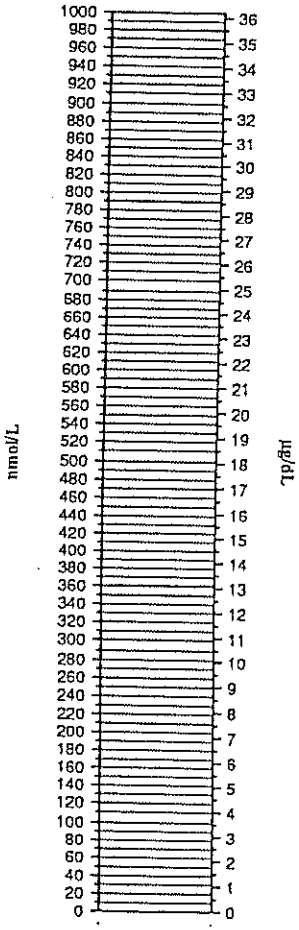
Complement Component 4 - serum
Multiplication Factor = 100
SI → Traditional



Cortisol - plasma, serum
Multiplication Factor = 27.59
Traditional → SI

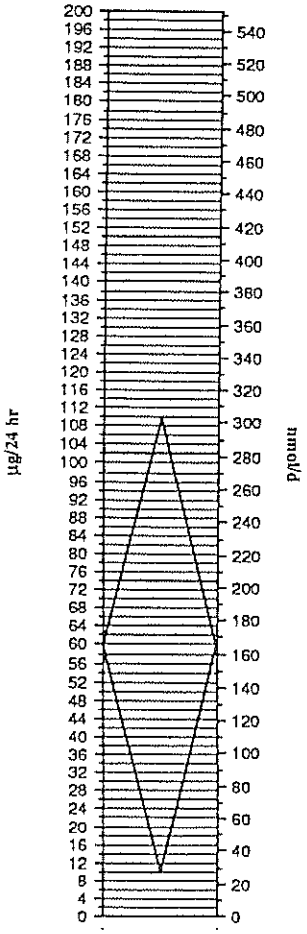


Cortisol - plasma, serum
Multiplication Factor = 0.0362
SI → Traditional

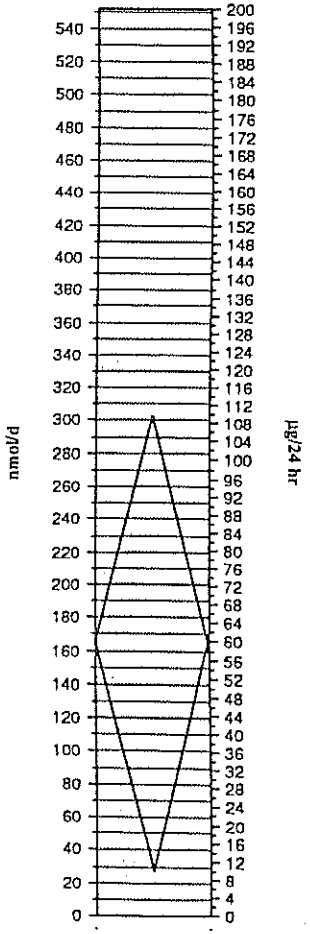


Normal Ranges	Traditional	SI
0800 hr	4 - 19	110 - 520
1800 hr	2 - 15	50 - 410
2400 hr	< 5	< 140

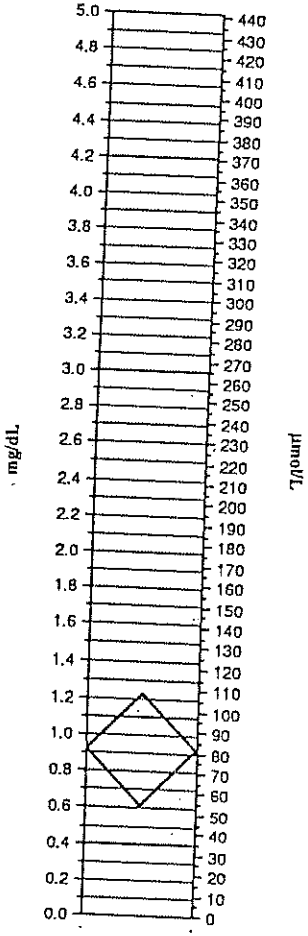
Cortisol , Free - urine
Multiplication Factor = 2.759
Traditional → SI



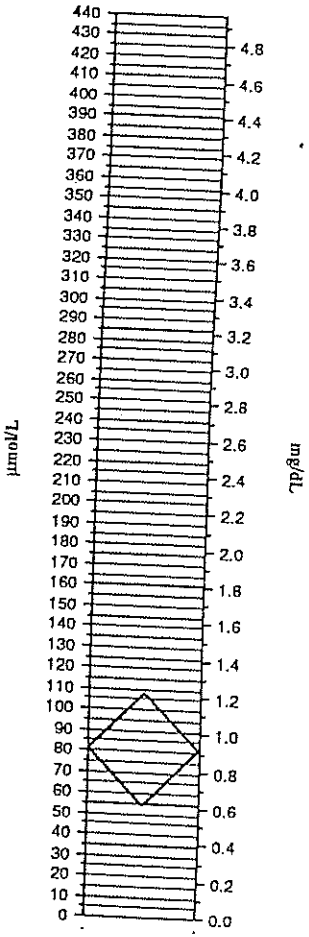
Cortisol , Free - urine
Multiplication Factor = 0.362
SI → Traditional



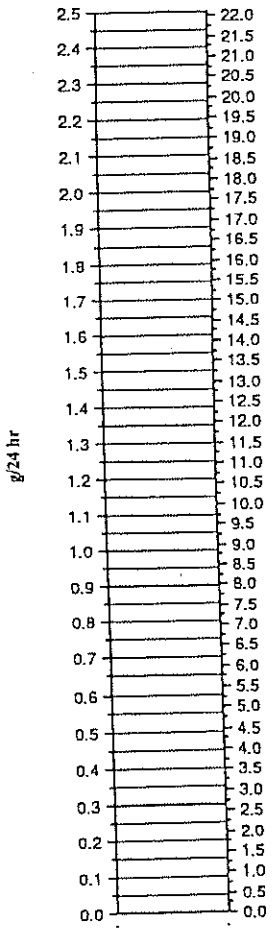
Creatinine - plasma, serum
Multiplication Factor = 88.4
Traditional → SI



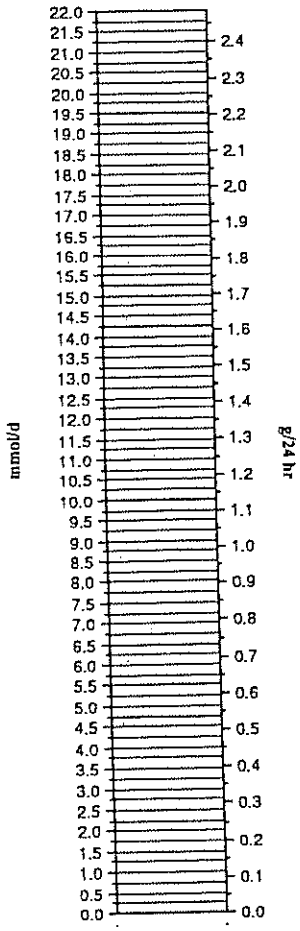
Creatinine - plasma, serum
Multiplication Factor = 0.0113
SI → Traditional



Creatinine - urine
Multiplication Factor = 8.84
Traditional → SI

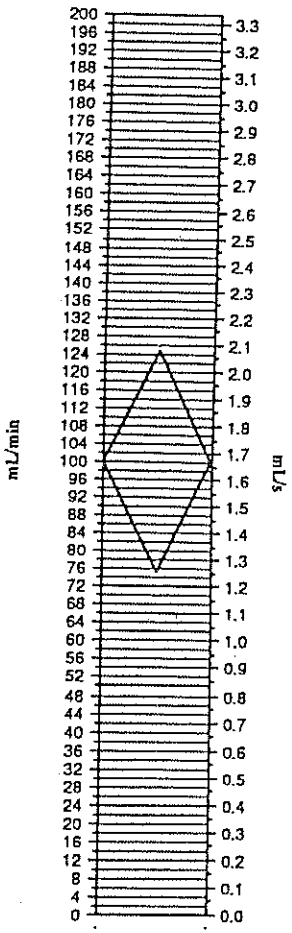


Creatinine - urine
Multiplication Factor = 0.113
SI → Traditional

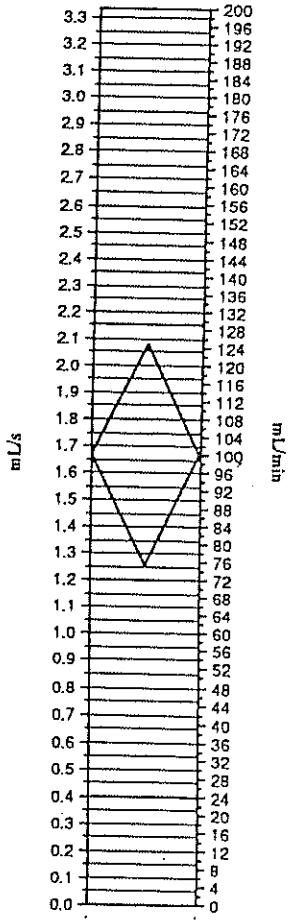


Normal Ranges	Traditional	SI
Male	1.0 - 2.0	8.8 - 17.6
Female	0.8 - 1.8	7.0 - 15.8

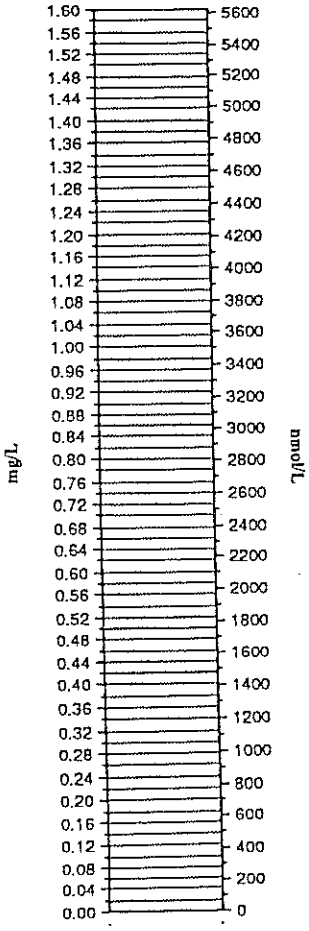
Creatinine Clearance - plsm, ser & urine
Multiplication Factor = 0.01667
Traditional → SI



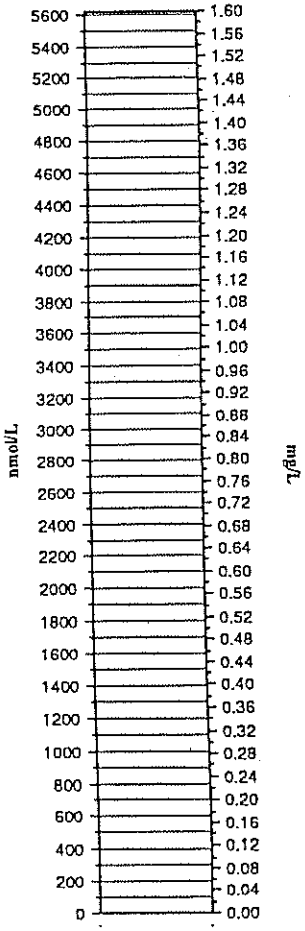
Creatinine Clearance - plsm, ser & urine
Multiplication Factor = 59.99
SI → Traditional



Diazepam - plasma, serum
Multiplication Factor = 3512
Traditional → SI

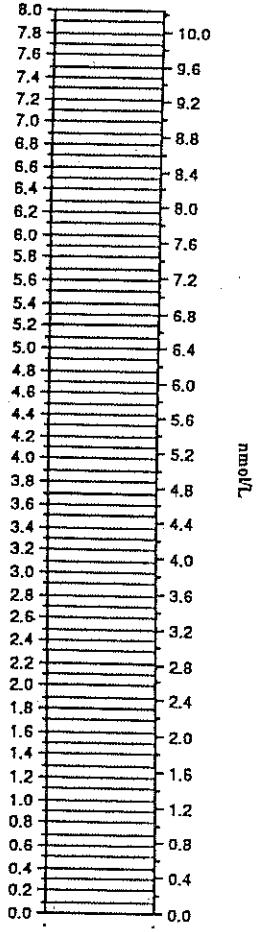


Diazepam - plasma, serum
Multiplication Factor = 0.00028
SI → Traditional

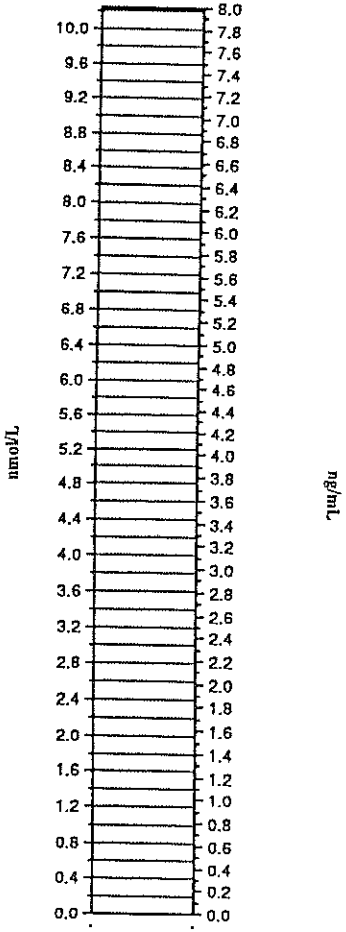


Normal Ranges	Traditional	SI
Therapeutic	0.1 - 0.25	350 - 900
Toxic	> 1.0	> 3510

Digoxin - serum
Multiplication Factor = 1.281
Traditional → SI

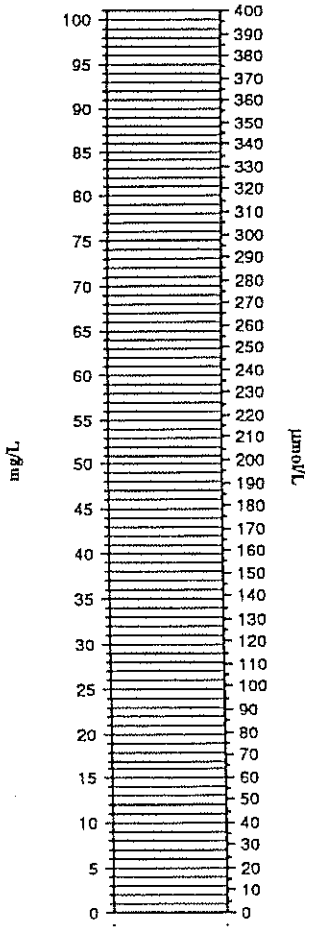


Digoxin - serum
Multiplication Factor = 0.7806
SI → Traditional

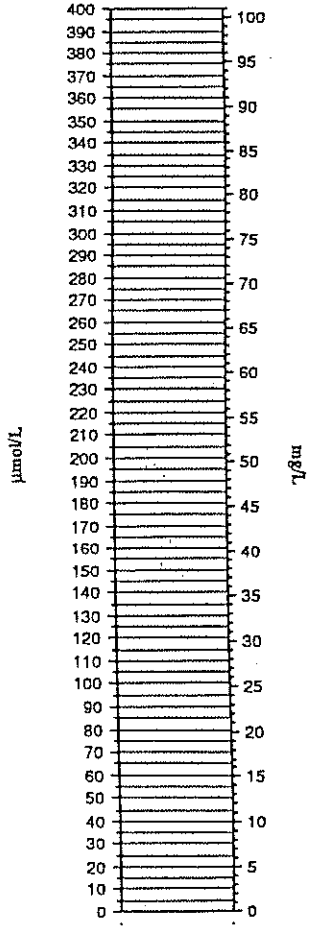


Normal Ranges	Traditional	SI
Therapeutic	0.5 - 2.2	0.6 - 2.8
Toxic	> 2.5	> 3.2

Dilantin (Phenytoin) - plasma, serum
Multiplication Factor = 3.964
Traditional → SI

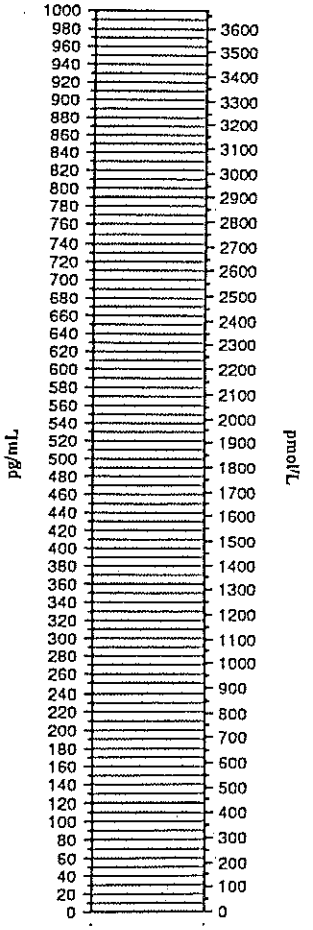


Dilantin (Phenytoin) - plasma, serum
Multiplication Factor = 0.2523
SI → Traditional

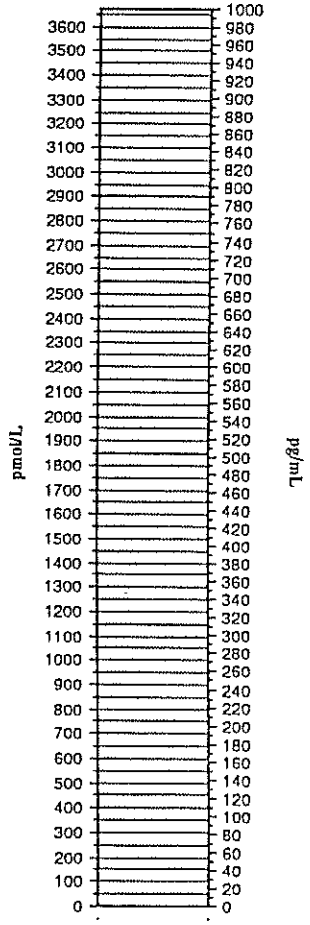


Normal Ranges	Traditional	SI
Therapeutic	10 - 20	40 - 80
Toxic	> 30	> 120

Estradiol - plasma, serum
Multiplication Factor = 3.671
Traditional → SI

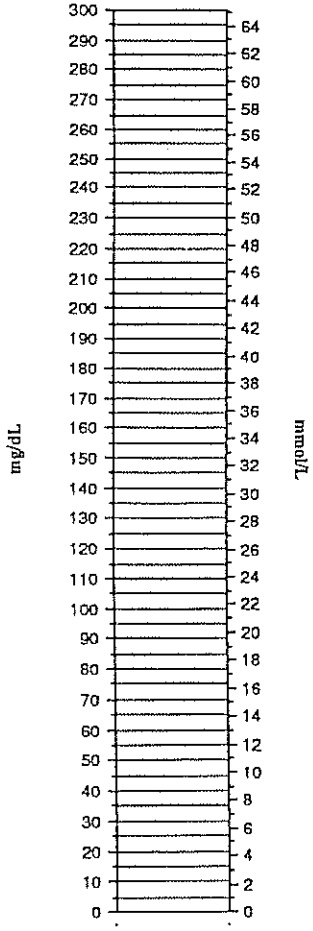


Estradiol - plasma, serum
Multiplication Factor = 0.2724
SI → Traditional

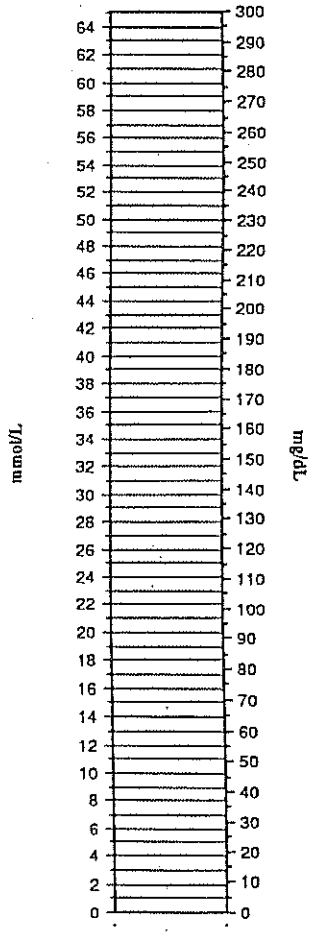


Normal Ranges	Traditional	SI
Female	20 - 300	70 - 1100
Peak Production	200 - 800	750 - 2900
Male	< 50	< 180

Ethanol - plasma, serum
Multiplication Factor = 0.2171
Traditional → SI

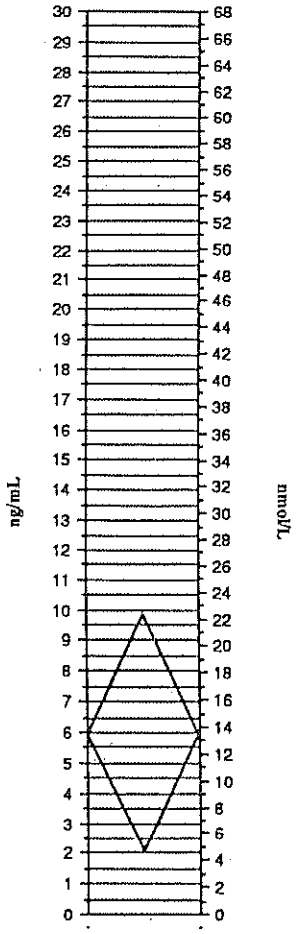


Ethanol - plasma, serum
Multiplication Factor = 4.606
SI → Traditional

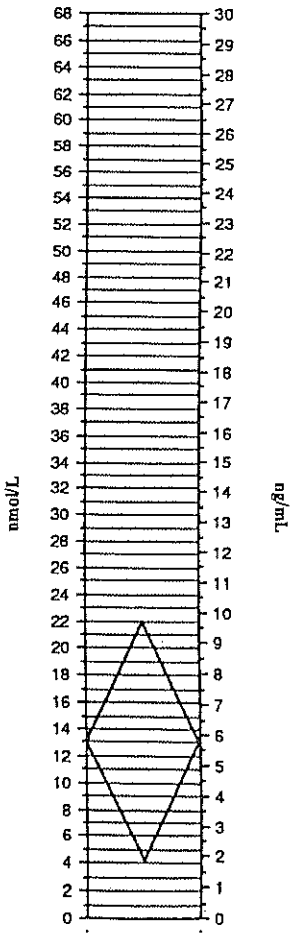


Normal Ranges	Traditional	SI
Toxic	> 100	> 22

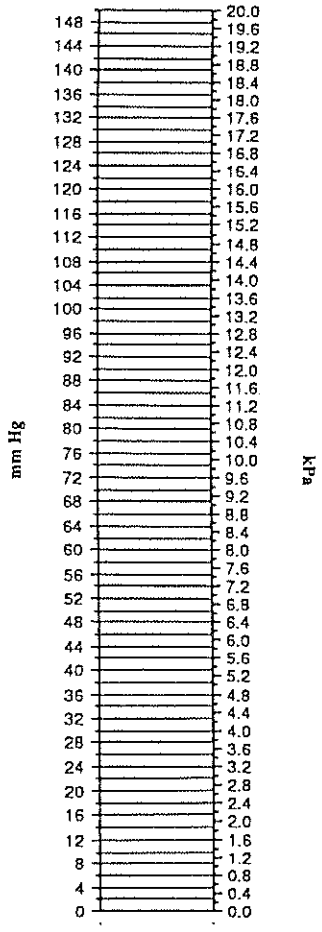
Folate - serum
Multiplication Factor = 2.266
Traditional → SI



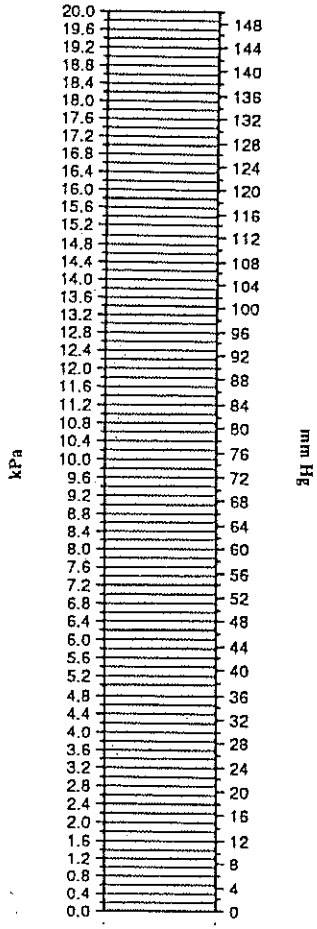
Folate - serum
Multiplication Factor = 0.4413
SI → Traditional



Gases (pO_2 & pCO_2) - arterial wh bld
Multiplication Factor = 0.1333
Traditional → SI

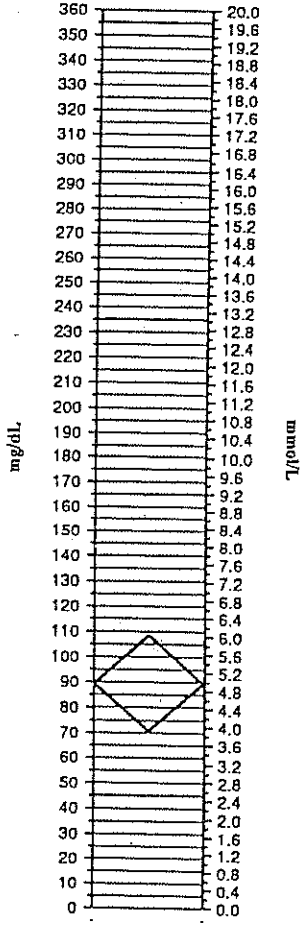


Gases (pO_2 & pCO_2) - arterial wh bld
Multiplication Factor = 7.50
SI → Traditional

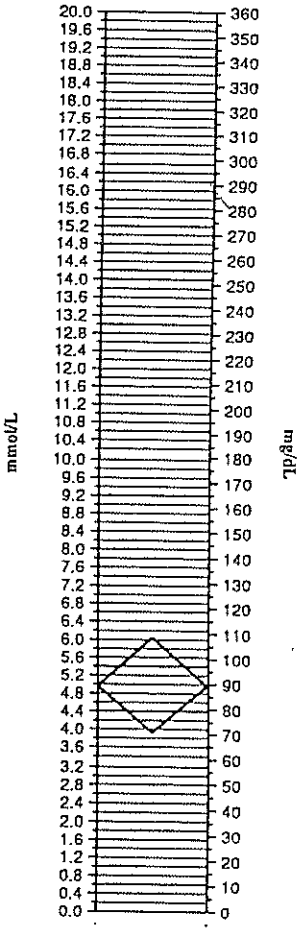


Normal Ranges	Traditional	SI
pCO_2	35 - 45	4.7 - 6.0
pO_2	75 - 100	10.0 - 13.3

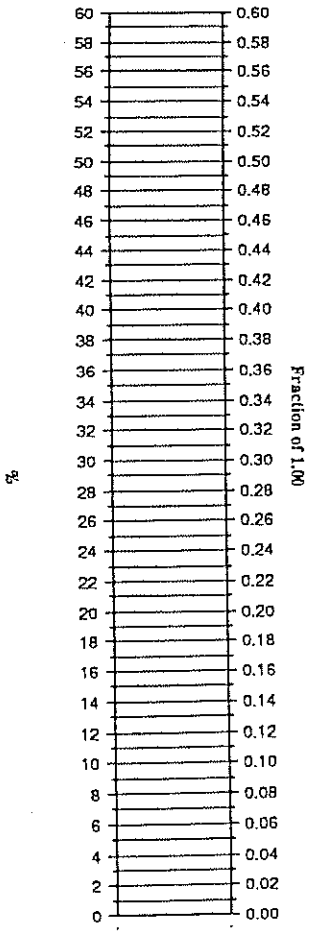
Glucose (fasting) - plasma, serum
Multiplication Factor = 0.05551
Traditional → SI



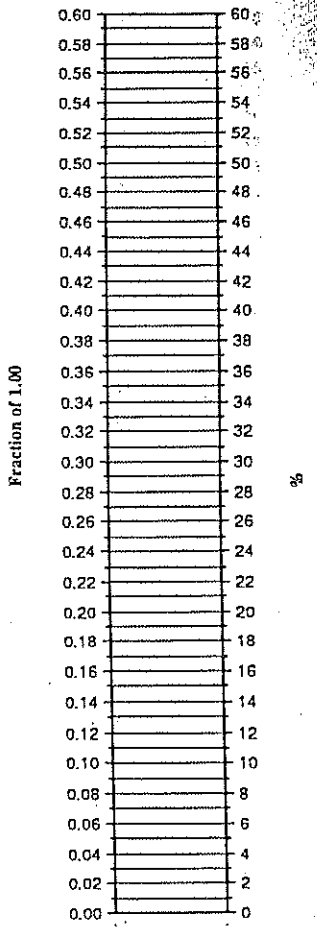
Glucose (fasting) - plasma, serum
Multiplication Factor = 18.01
SI → Traditional



Hematocrit - whole blood
Multiplication Factor =0.01
Traditional → SI

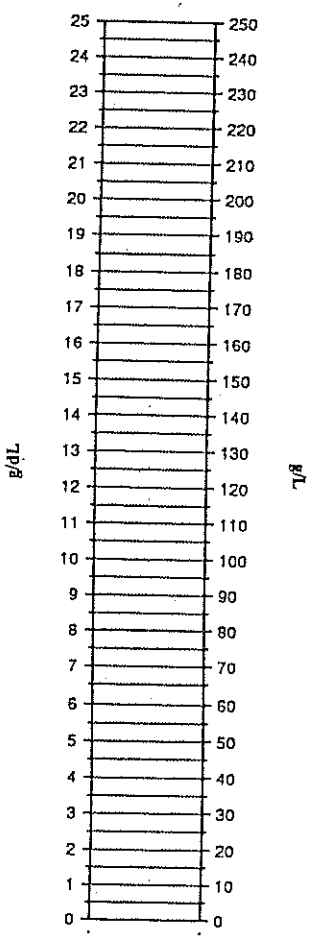


Hematocrit - whole blood
Multiplication Factor = 100
SI → Traditional

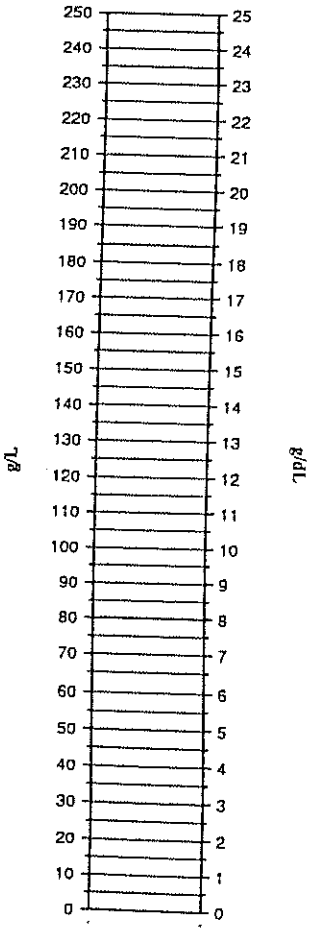


Normal Ranges	Traditional	SI
Female	33 - 43	0.33 - 0.43
Male	39 - 49	0.39 - 0.49

Hemoglobin, Mass Concentration - whole blood
Multiplication Factor =10.0
Traditional → SI

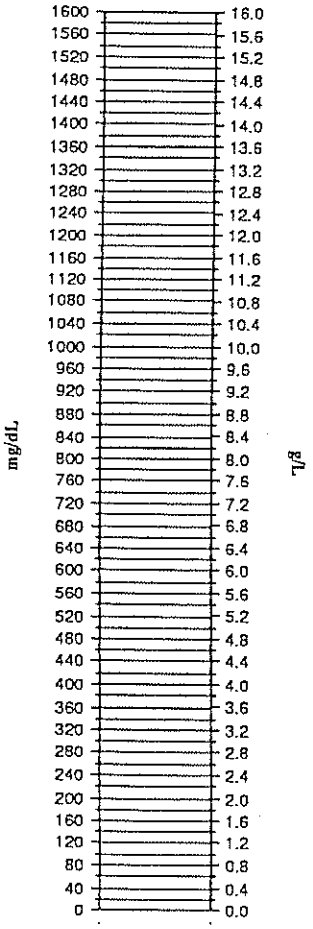


Hemoglobin, Mass Concentration - whole blood
Multiplication Factor = 0.1
SI → Traditional

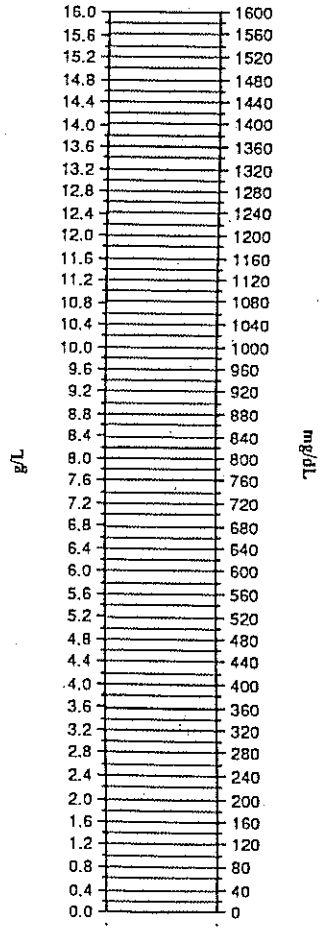


Normal Ranges	Traditional g/dl	SI g/L
Mass Concentration		
Female	14.0 - 18.0	140 - 180
Male	11.5 - 15.5	115 - 155

Immunoglobulins - IgG, IgA, IgM - serum
Multiplication Factor =0.01
Traditional → SI

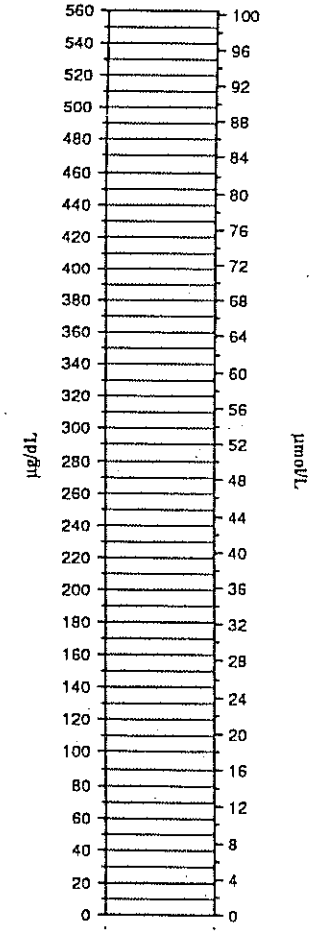


Immunoglobulins - IgG, IgA, IgM - serum
Multiplication Factor = 100
SI → Traditional

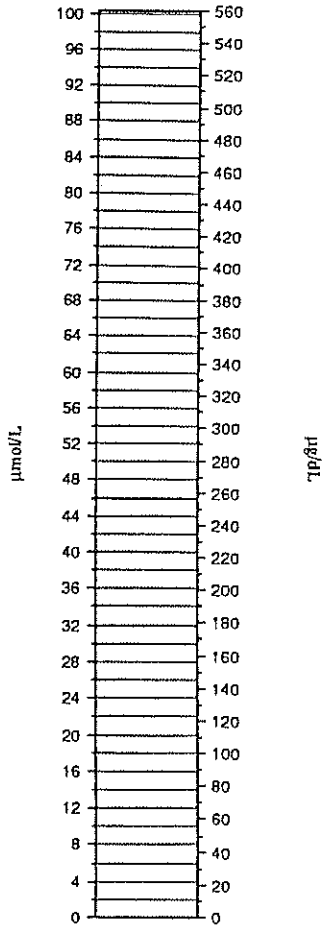


Normal Ranges	Traditional	SI
IgG	500 - 1200	5.00 - 12.00
IgA	50 - 350	0.50 - 3.50
IgM	30 - 230	0.30 - 2.30

Iron & Iron Binding Capacity - serum
Multiplication Factor = 0.1791
Traditional → SI

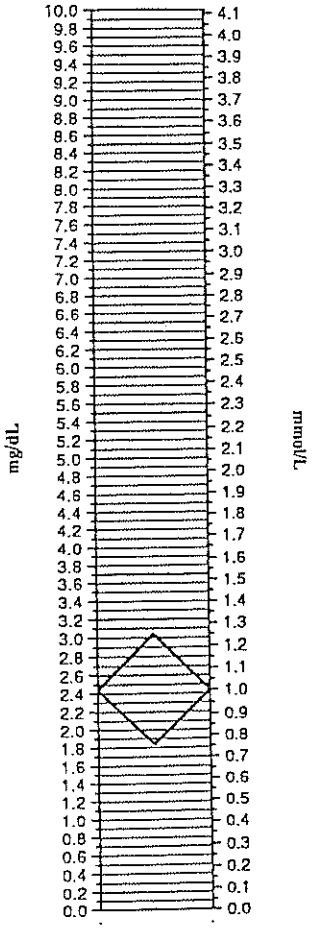


Iron & Iron Binding Capacity - serum
Multiplication Factor = 5.58
SI → Traditional

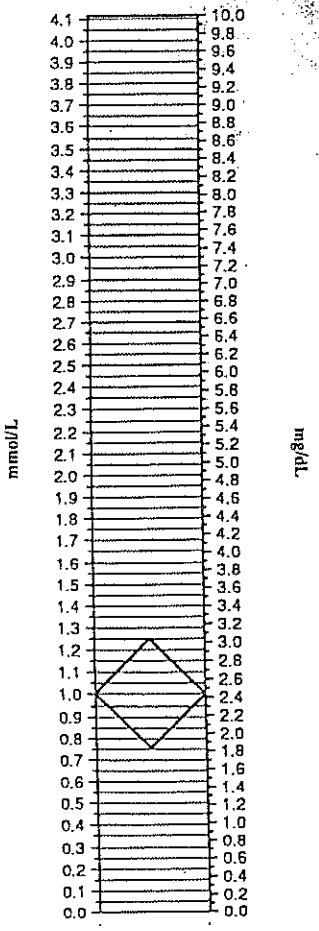


Normal Ranges	Traditional	SI
Iron		
Male	80 - 180	14 - 32
Female	60 - 160	11 - 29
Iron Binding Capacity	250 - 460	45 - 82

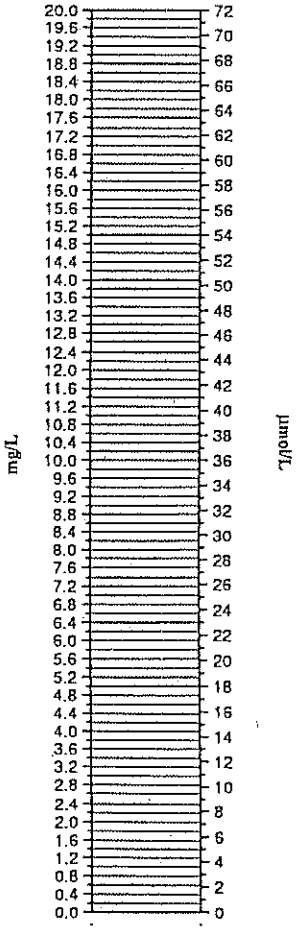
Magnesium - plasma, serum
Multiplication Factor = 0.4114
Traditional → SI



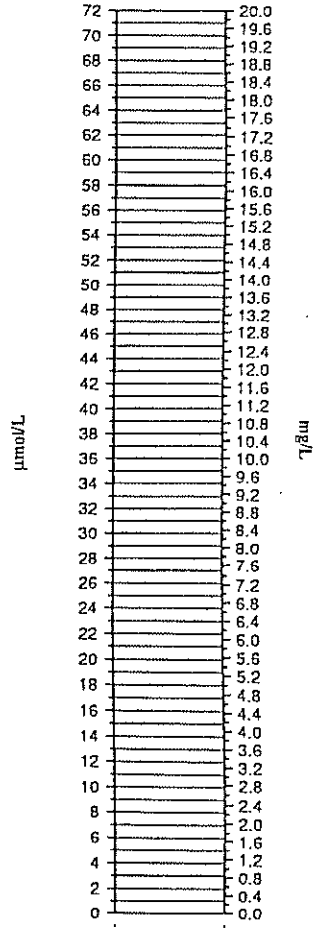
Magnesium - plasma, serum
Multiplication Factor = 2.431
SI → Traditional



N-acetylprocainamide - plasma, serum
Multiplication Factor = 3.606
Traditional → SI

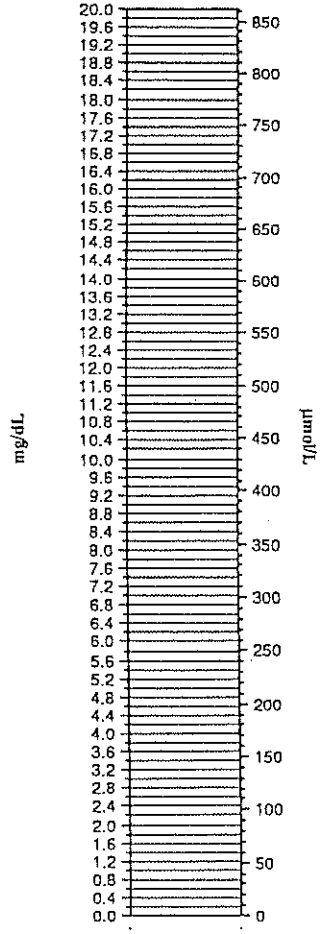


N-acetylprocainamide - plasma, serum
Multiplication Factor = 0.277
SI → Traditional

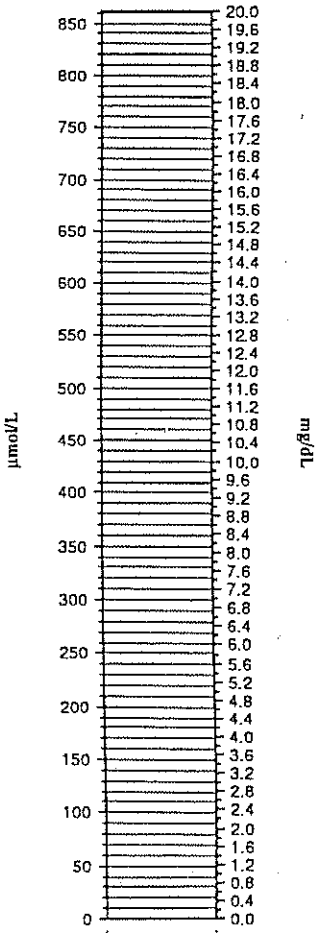


Normal Ranges	Traditional	SI
Therapeutic	4.0 - 8.0	14 - 29

Phenobarbital - plasma, serum
Multiplication Factor = 43.06
Traditional → SI

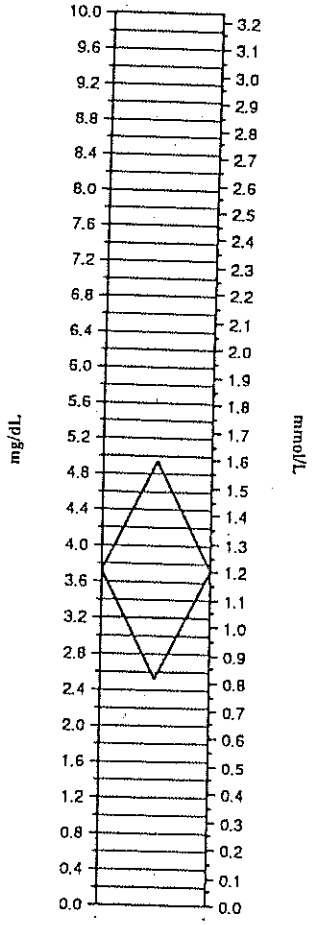


Phenobarbital - plasma, serum
Multiplication Factor = 0.0232
SI → Traditional

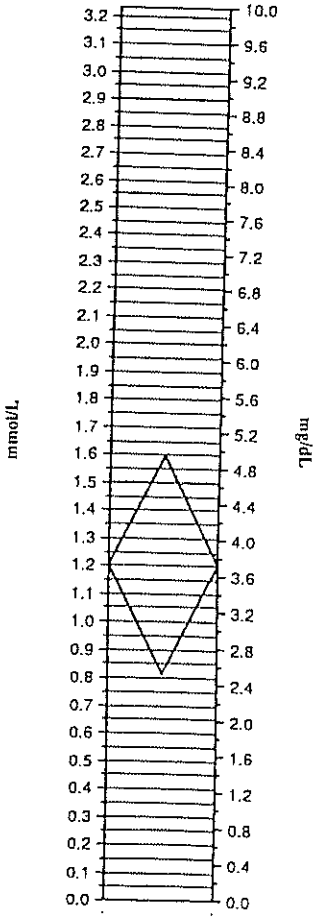


Normal Ranges	Traditional	SI
Therapeutic	2 - 5	85 - 215

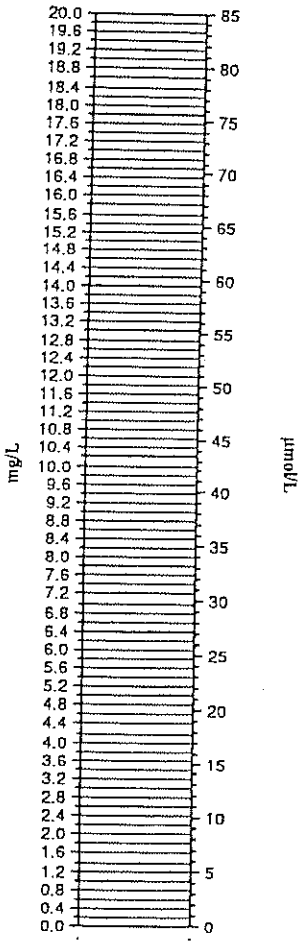
Phosphate (as Phosphorus, Inorganic)
Serum
Multiplication Factor = 0.3229
Traditional → SI



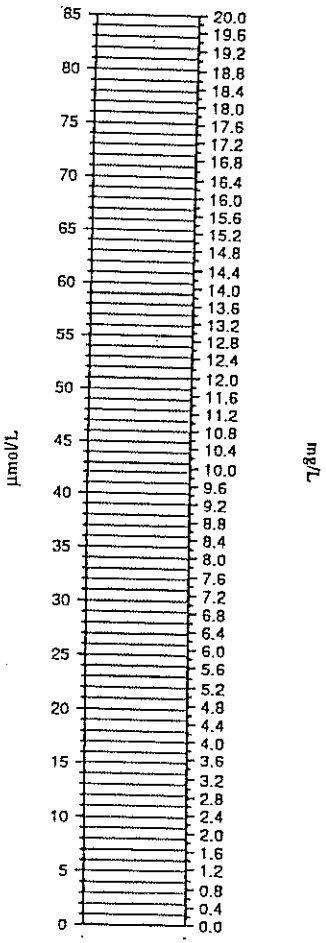
Phosphate (as Phosphorus, Inorganic)
Serum
Multiplication Factor = 3.097
SI → Traditional



Procainamide - plasma, serum
Multiplication Factor = 4.249
Traditional → SI

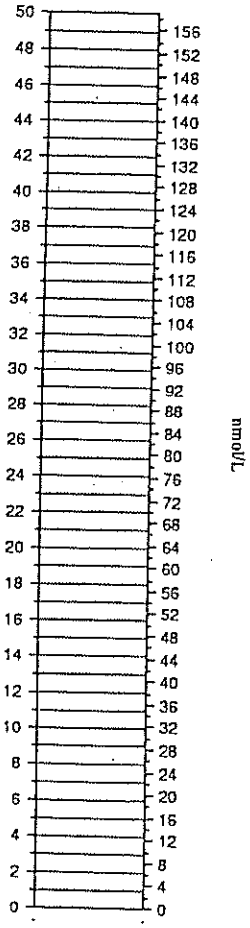


Procainamide - plasma, serum
Multiplication Factor = 0.235
SI → Traditional

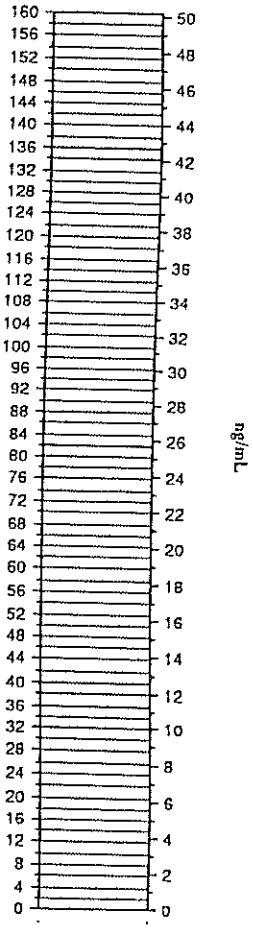


Normal Ranges	Traditional	SI
Therapeutic	4.0 - 8.0	17 - 34
Toxic	> 12	> 50

Progesterone - plasma, serum
Multiplication Factor = 3.18
Traditional → SI

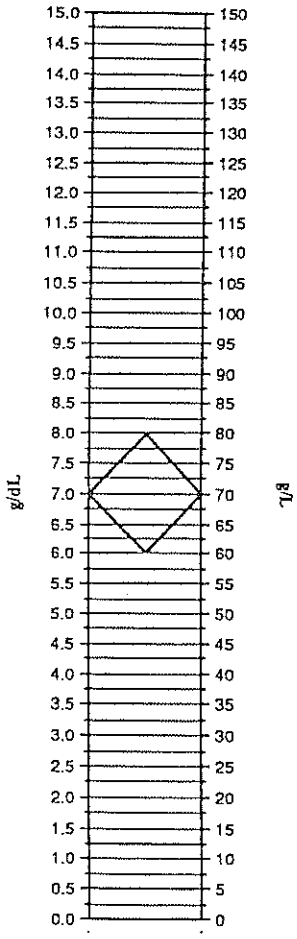


Progesterone - plasma, serum
Multiplication Factor = 0.314
SI → Traditional

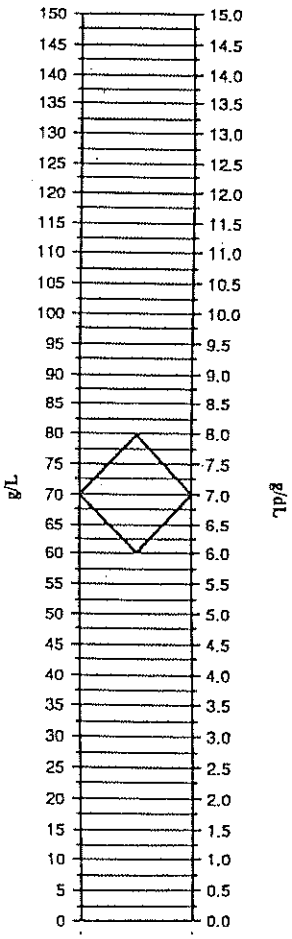


Normal Ranges	Traditional	SI
Follicular Phase	< 2	< 6
Luteal Phase	2 - 20	6 - 64

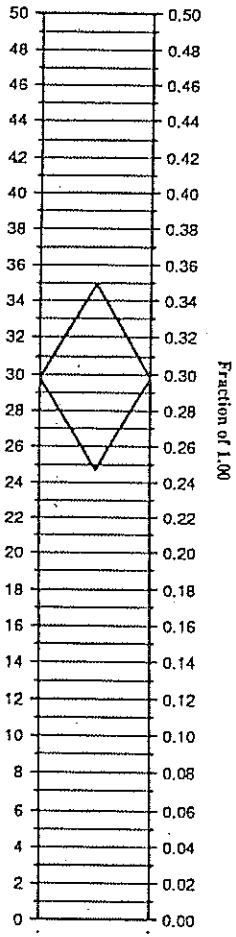
Protein, Total - plasma, serum
Multiplication Factor = 10
Traditional → SI



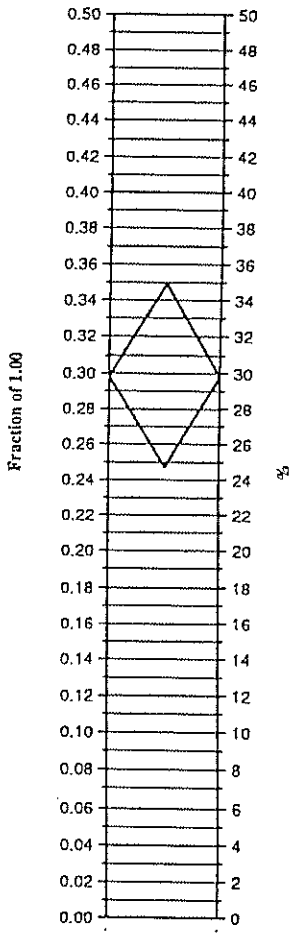
Protein, Total - plasma, serum
Multiplication Factor = 0.1
SI → Traditional



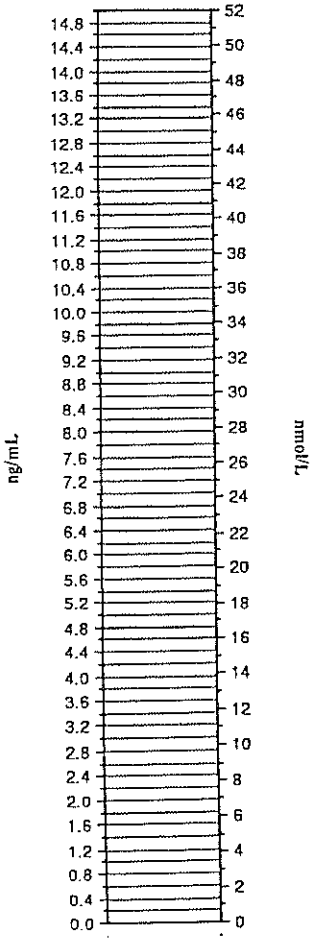
T3 Uptake - serum
Multiplication Factor = 0.01
Traditional → SI



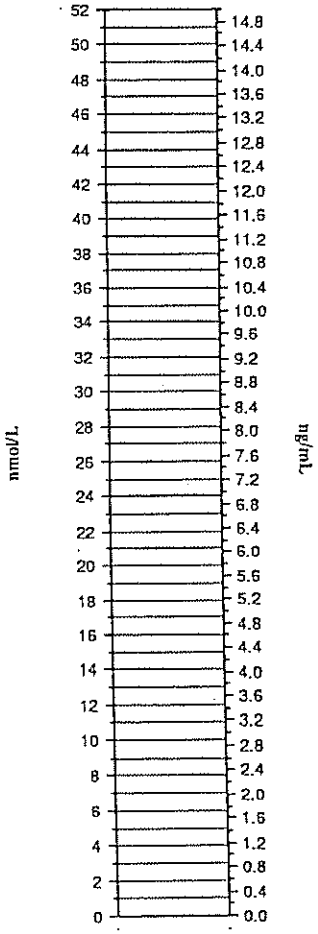
T3 Uptake - serum
Multiplication Factor = 100
SI → Traditional



Testosterone - plasma, serum
Multiplication Factor = 3.467
Traditional → SI

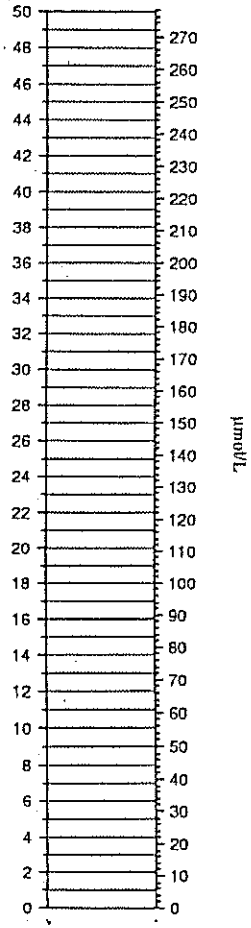


Testosterone - plasma, serum
Multiplication Factor = 0.288
SI → Traditional

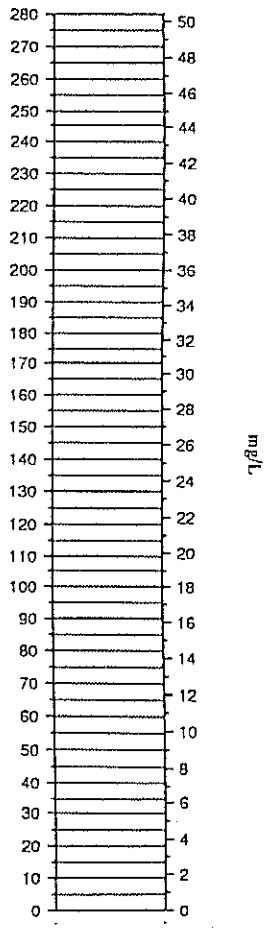


Normal Ranges	Traditional	SI
Female	< 0.6	< 2.0
Male	4.0 - 8.0	14.0 - 28.0

Theophylline - plasma, serum
Multiplication Factor = 5.55
Traditional → SI

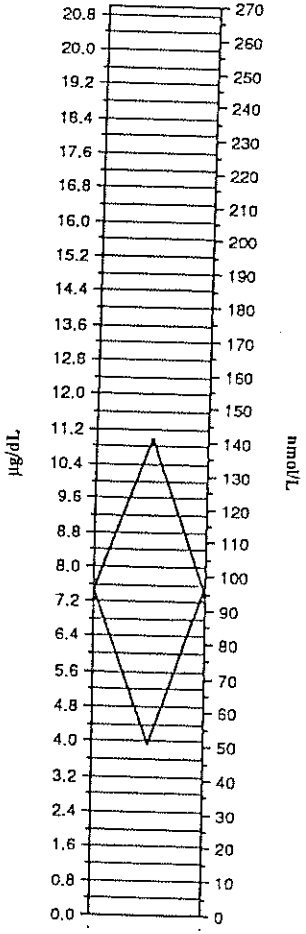


Theophylline - plasma, serum
Multiplication Factor = 0.180
SI → Traditional

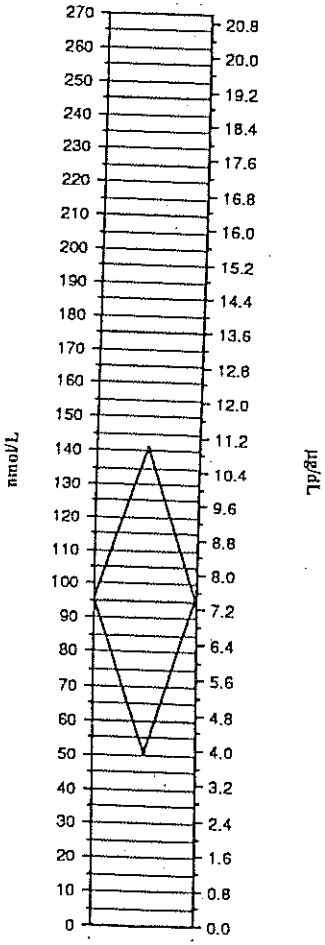


Normal Ranges	Traditional	SI
Therapeutic	10.0 - 20.0	55 - 110

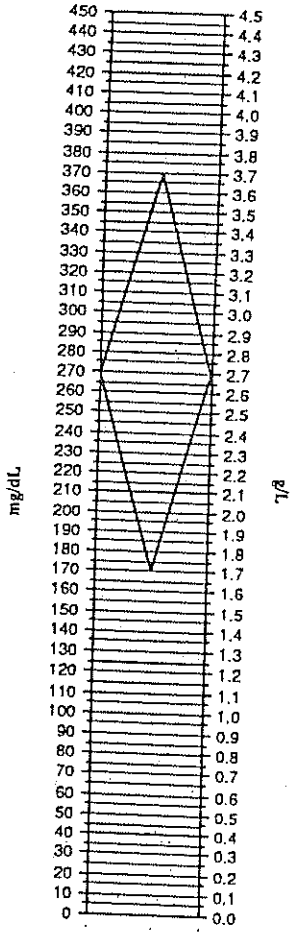
Thyroxine (T4) - serum
Multiplication Factor = 12.87
Traditional → SI



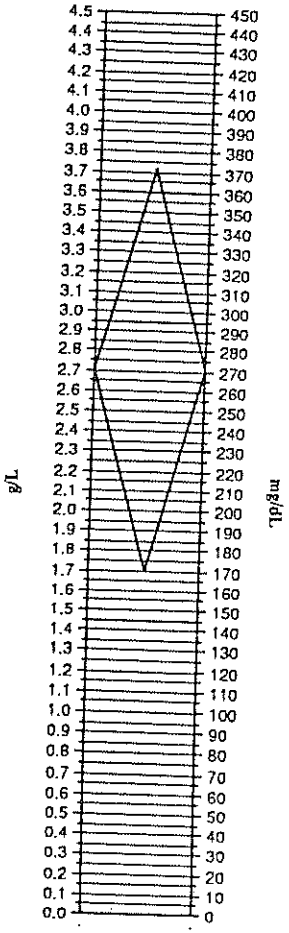
Thyroxine (T4) - serum
Multiplication Factor = 0.078
SI → Traditional



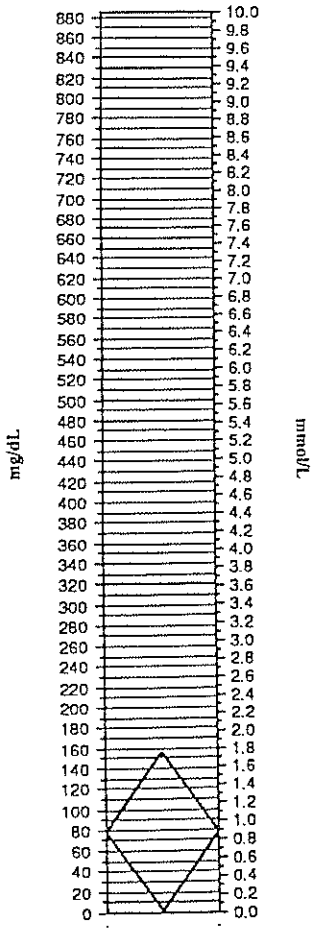
Transferrin - serum
Multiplication Factor = 0.01
Traditional → SI



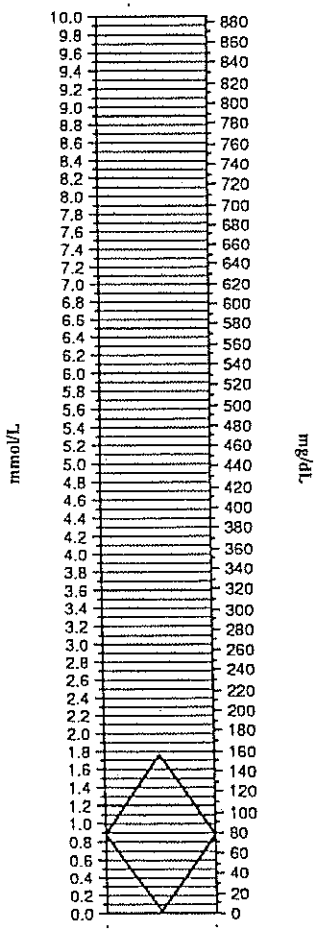
Transferrin - serum
Multiplication Factor = 100
SI → Traditional



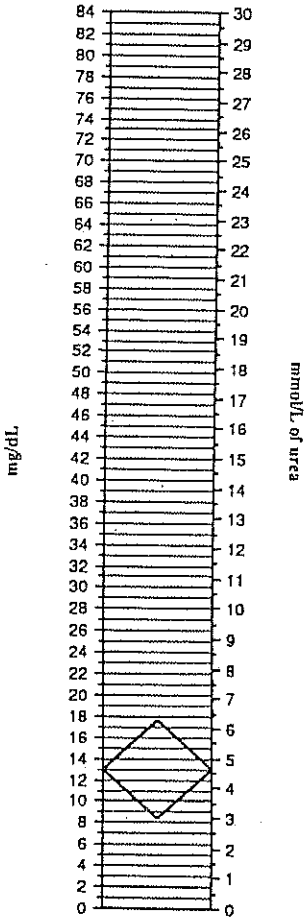
Triglycerides (as Triolein) - serum
Multiplication Factor = 0.01129
Traditional → SI



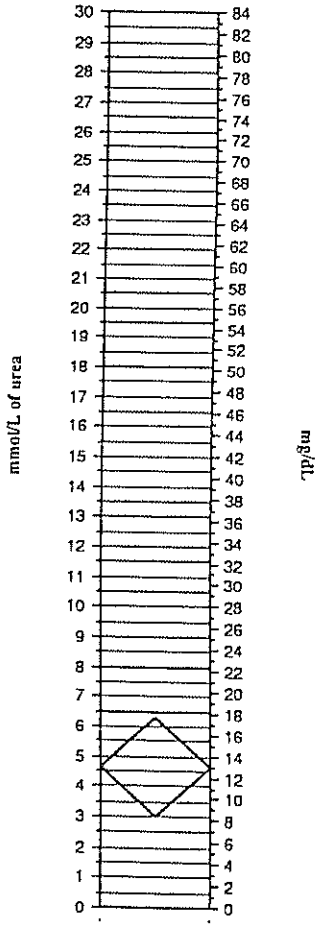
Triglycerides (as Triolein) - serum
Multiplication Factor = 88.57
SI → Traditional



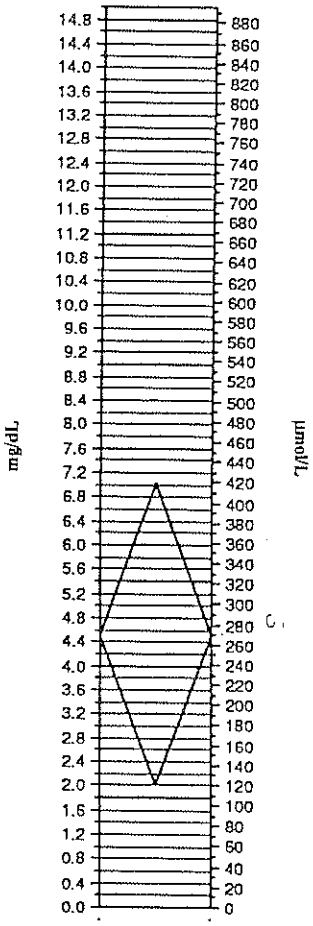
Urea Nitrogen - plasma, serum
Multiplication Factor = 0.357
Traditional → SI



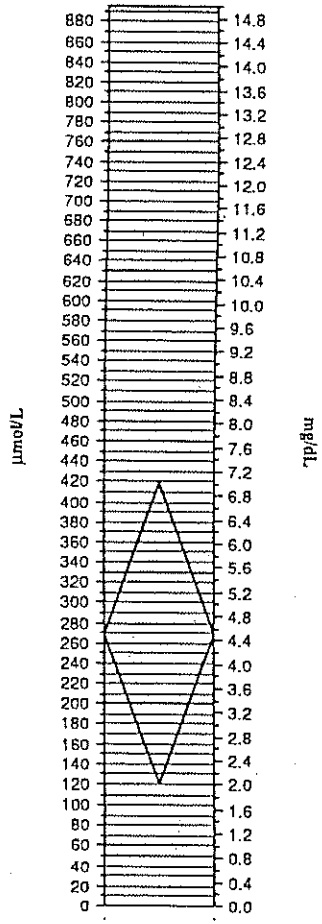
Urea Nitrogen - plasma, serum
Multiplication Factor = 2.801
SI → Traditional



Uric Acid (as Urate) - serum
Multiplication Factor = 59.48
Traditional → SI



Uric Acid (as Urate) - serum
Multiplication Factor = 0.0168
SI → Traditional



Section III

SI UNIT CONVERSION TABLE

NORMAL RANGES

The normal ranges listed are suggested ones and are included as a helpful guide. Different laboratories use a variety of analytical methods and are likely to have normal ranges different from the ones included in this table. For many constituents in the table, there are several different normal ranges for pediatric patients (example: for newborns, infants, and adolescents), many of which are different from those for adults. The conversion factors are not affected by this difference. Therefore, although the conversion factors are suitable for pediatric patients, the normal ranges in the table should be used for adult patients only (with a few clearly noted exceptions). For pediatric normal ranges, see *Nelson: Textbook of Pediatrics* by R.E. Behrman and V.C. Vaughan III.

FLUIDS

To obtain a consensus on whether plasma, serum, or whole blood are suitable samples for analysis of blood-borne compounds, I reviewed published tables from articles listed in the bibliography, the Massachusetts General Hospital Clinical Laboratory Handbook, and laboratory handbooks from several large commercial laboratories. It is understood that plasma specimens may be suitable only if collected in a specific anticoagulant (for example:

heparin may be acceptable, but not citrate). It is also understood that the normal range for a given compound may not be identical for serum and for plasma. However, since the suggested normal range is only an approximation of the normal range for a given laboratory, and the difference in normal values between serum and plasma is usually small, these variations are not taken into account. It is further recognized that certain compounds listed as being measured only in plasma or only in serum may in fact be accurately measured in both. Whole blood is listed in the table as the sample fluid for determining RBC number and mean RBC corpuscular volume because anticoagulated whole blood is aspirated into an automated cell counter.

ABBREVIATIONS

Abbreviations found in the table include multiples and submultiples of the gram (g), the mole (mol), the liter (L), the meter (m), the equivalent (Eq), the International enzyme unit (U or IU), the katal (kat), the pascal (Pa), and the osmole (Osm). The units of time — the second (s), the minute (min), the hour (hr), and the day (d) are also found in the table. Constituents that also have a nomogram included in Section II are denoted with an **N**.

SIGNIFICANT DIGITS & SUGGESTED ANALYTICAL PRECISION

The information in these columns, obtained from several articles listed in the bibliography, reflects the recommended number of digits in the reported value and the suggested increment for the value. The suggested increment, applicable to all values, is based upon the presumed analytical precision of the assays.

CONSTITUENT	FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR ---> MULT DIV <---	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
Acetaminophen								
Therapeutic	plasma, serum	0.2 - 0.5	mg/dL	66.16	13 - 40	µmol/L	XX	1 µmol/L
Toxic	plasma, serum	> 5.0	mg/dL	66.16	>330	µmol/L	XXO	10 µmol/L
Acetoacetate	plasma, serum	0.3 - 3.0	mg/dL	97.95	30 - 300	µmol/L	XXO	10 µmol/L
Acetone	plasma, serum	0	mg/dL	172.2	0	µmol/L	XXO	10 µmol/L
Acid Phosphatase (prostatic)	serum	0 - 0.8 (37°C)	Units/L	1	0 - 0.8	U/L	X.X	0.1 U/L
	serum	0 - 0.8 (37°C)	Units/L	16.67	0 - 13.3	nkat/L	XX.X	0.1 nkat/L
ACTH (adrenocorticotropin) N	plasma	20 - 100	pg/mL	0.2202	4 - 22	pmol/L	XX	1 pmol/L
Adrenocorticotropin (ACTH) N	plasma	20 - 100	pg/mL	0.2202	4 - 22	pmol/L	XX	1 pmol/L
Alanine Aminotransferase (ALT, SGPT)	serum	0 - 35 (37°C)	Units/L	1	0 - 35	U/L	XX	1 U/L
	serum	0 - 35 (37°C)	Units/L	0.01667	0 - 0.58	µkat/L	X.XX	0.02 µkat/L
Alanine, amino acid fractionation	plasma, serum	2.2 - 4.5	mg/dL	112.20	245 - 500	µmol/L	XXX	5 µmol/L
Albumin N	serum	4.0 - 6.0	g/dL	10	40 - 60	g/L	XX	1 g/L
Aldolase	serum	0 - 6 (37°C)	Units/L	1	0 - 6	U/L	XX	1 U/L
	serum	0 - 6 (37°C)	Units/L	16.67	0 - 100	nkat/L	XXO	20 nkat/L
Aldosterone								
Normal Salt Diet	serum	8.1 - 15.5	ng/dL	27.74	220 - 430	pmol/L	XXO	10 pmol/L
Restricted Salt Diet	serum	20.8 - 44.4	ng/dL	27.74	580 - 1240	pmol/L	XXO	10 pmol/L
Aldosterone, sodium excretion								
= 25 mmol/24 hr	urine	18 - 85	µg/24 hr	2.774	50 - 235	nmol/d	XXX	5 nmol/d
= 75 - 125 mmol/24 hr	urine	5 - 26	µg/24 hr	2.774	15 - 70	nmol/d	XXX	5 nmol/d
= 200 mmol/24 hr	urine	1.5 - 12.5	µg/24 hr	2.774	5 - 35	nmol/d	XXX	5 nmol/d
Alkaline phosphatase	serum	30 - 120 (37°C)	Units/L	1	30 - 120	U/L	XXX	1 U/L
	serum	30 - 120 (37°C)	Units/L	0.01667	0.5 - 2.0	µkat/L	X.X	0.1 µkat/L
ALT (alanine aminotransferase, SGPT)	serum	0 - 35 (37°C)	Units/L	1	0 - 35	U/L	XXX	1 U/L
	serum	0 - 35 (37°C)	Units/L	0.01667	0 - 0.58	µkat/L	X.XX	0.01 µkat/L
Aluminum	serum	0 - 15	µg/L	37.06	0 - 560	nmol/L	XXXO	10 nmol/L
Alpha-Aminobutyric acid, amino acid fractionation	plasma, serum	0.1 - 0.2	mg/dL	96.97	10 - 20	µmol/L	XXX	5 µmol/L
Alpha-1-Antitrypsin	serum	150 - 350	mg/dL	0.01	1.5 - 3.5	g/L	X.X	0.1 g/L
Alpha-Fetoprotein	amniotic fluid	gestation dependent	mg/dL	10	gestation dependent	mg/L	XX	1 mg/L
Alpha-Fetoprotein	serum	0 - 20	ng/mL	1	0 - 20	µg/L	XX	1 µg/L
17-alpha-Hydroxyprogesterone								
Children	plasma, serum	0.2 - 1.4	µg/L	3.026	0.5 - 4.5	nmol/L	XX.X	0.5 nmol/L
Male	plasma, serum	0.5 - 2.5	µg/L	3.026	1.5 - 7.5	nmol/L	XX.X	0.5 nmol/L
Female	plasma, serum	0.3 - 4.2	µg/L	3.026	1.0 - 13.0	nmol/L	XX.X	0.5 nmol/L
Female, postmenopausal	plasma, serum	0.3 - 1.7	µg/L	3.026	1.0 - 5.0	nmol/L	XX.X	0.5 nmol/L
Alpha-2-Macroglobulin	serum	145 - 410	mg/dL	0.01	1.5 - 4.1	g/L	X.X	0.1 g/L
Alpha-Tocopherol (vitamin E)	plasma, serum	0.78 - 1.25	mg/dL	23.22	18 - 29	µmol/L	XX	1 µmol/L
Amikacin, therapeutic (peak)	serum	15 - 25	µg/mL	1.71	25.6 - 42.7	µmol/L	XX.X	0.1 µmol/L

CONSTITUENT	FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR → MULT DIV ←	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
Amino Acid fractionation								
Alanine	plasma, serum	2.2 - 4.5	mg/dL	112.20	245 - 500	µmol/L	XXX	5 µmol/L
Alpha-Aminobutyric acid	plasma, serum	0.1 - 0.2	mg/dL	96.97	10 - 20	µmol/L	XXX	5 µmol/L
Arginine	plasma, serum	0.5 - 2.5	mg/dL	57.40	30 - 145	µmol/L	XXX	5 µmol/L
Asparagine	plasma, serum	0.5 - 0.6	mg/dL	75.69	35 - 45	µmol/L	XXX	5 µmol/L
Aspartic acid	plasma, serum	0.0 - 0.3	mg/dL	75.13	0 - 20	µmol/L	XXX	5 µmol/L
Citrulline	plasma, serum	0.2 - 1.0	mg/dL	57.08	15 - 55	µmol/L	XXX	5 µmol/L
Cystine	plasma, serum	0.2 - 2.2	mg/dL	41.61	10 - 90	µmol/L	XXX	5 µmol/L
Glutamic acid	plasma, serum	0.2 - 2.8	mg/dL	67.97	15 - 190	µmol/L	XXX	5 µmol/L
Glutamine	plasma, serum	6.1 - 10.2	mg/dL	68.42	420 - 700	µmol/L	XXX	5 µmol/L
Glycine	plasma, serum	0.9 - 4.2	mg/dL	133.20	120 - 560	µmol/L	XXX	5 µmol/L
Histidine	plasma, serum	0.5 - 1.7	mg/dL	64.45	30 - 110	µmol/L	XXX	5 µmol/L
Hydroxyproline	plasma, serum	0 - trace	mg/dL	76.26	0 - trace	µmol/L	XXX	5 µmol/L
Isoleucine	plasma, serum	0.5 - 1.3	mg/dL	76.24	40 - 100	µmol/L	XXX	5 µmol/L
Leucine	plasma, serum	1.0 - 2.3	mg/dL	76.24	76 - 176	µmol/L	XXX	5 µmol/L
Lysine	plasma, serum	1.2 - 3.5	mg/dL	68.40	80 - 240	µmol/L	XXX	5 µmol/L
Methionine	plasma, serum	0.1 - 0.6	mg/dL	67.02	5 - 40	µmol/L	XXX	5 µmol/L
Ornithine	plasma, serum	0.4 - 1.4	mg/dL	75.67	30 - 400	µmol/L	XXX	5 µmol/L
Phenylalanine	plasma, serum	0.6 - 1.5	mg/dL	60.54	35 - 90	µmol/L	XXX	5 µmol/L
Proline	plasma, serum	1.2 - 3.9	mg/dL	86.86	105 - 340	µmol/L	XXX	5 µmol/L
Serine	plasma, serum	0.8 - 1.8	mg/dL	95.16	75 - 170	µmol/L	XXX	5 µmol/L
Taurine	plasma, serum	0.3 - 2.1	mg/dL	79.91	25 - 170	µmol/L	XXX	5 µmol/L
Threonine	plasma, serum	0.9 - 2.5	mg/dL	83.95	75 - 210	µmol/L	XXX	5 µmol/L
Tryptophan	plasma, serum	0.5 - 2.5	mg/dL	48.97	25 - 125	µmol/L	XXX	5 µmol/L
Tyrosine	plasma, serum	0.4 - 1.6	mg/dL	55.19	20 - 90	µmol/L	XXX	5 µmol/L
Valine	plasma, serum	1.7 - 3.7	mg/dL	85.35	145 - 315	µmol/L	XXX	5 µmol/L
Amino Acid Nitrogen	plasma	4.0 - 6.0	mg/dL	0.7139	2.9 - 4.3	mmol/L	X.X	0.1 mmol/L
Amino Acid Nitrogen	urine	50 - 200	mg/24 hr	0.07139	3.6 - 14.3	mmol/d	XX.X	0.1 mmol/d
delta-Aminolevulinate (as aminolevulinic acid)	urine	1.0 - 7.0	mg/24 hr	7.626	8 - 53	µmol/d	XX	1 µmol/d
Amitriptyline, therapeutic	serum	50 - 200	ng/mL	3.605	180 - 720	nmol/L	XXO	10 nmol/L
Ammonia								
as ammonia (NH3) N	plasma	10 - 80	µg/dL	0.5872	5 - 50	µmol/L	XXX	5 µmol/L
as ammonium (NH4+)	plasma	10 - 85	µg/dL	0.5543	5 - 50	µmol/L	XXX	5 µmol/L
as nitrogen (N)	plasma	10 - 65	µg/dL	0.7139	5 - 50	µmol/L	XXX	5 µmol/L
Amylase	serum	0 - 130 (37°C)	Units/L	1	0 - 130	U/L	XXX	1 U/L
	serum	0 - 130 (37°C)	Units/L	0.01667	0 - 2.17	µkat/L	X.XX	0.01 µkat/L
ANA (Antinuclear Antibodies)	serum	negative at 1:10 dil	highest pos. dil.	1	negative at 1:10 dil	highest pos. dil.	1:XX	
Androstenedione								
Male > 18 yrs	serum	0.2 - 3.0	µg/L	3.492	0.5 - 10.5	nmol/L	XX.X	0.5 nmol/L
Female >18 yrs	serum	0.8 - 3.0	µg/L	3.492	3.0 - 10.5	nmol/L	XX.X	0.5 nmol/L

CONSTITUENT	FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR —> MULT DIV <—	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
Androsterone (ketosteroid fractions)								
Female	urine	0.5 - 3.0	mg/24 hr	3.443	1 - 10	µmol/d	XX	1 µmol/d
Male	urine	2.0 - 5.0	mg/24 hr	3.443	7 - 17	µmol/d	XX	1 µmol/d
Angiotensin converting enzyme	serum	< 40 (37°C)	U/L	1	<40	U/L	XX	1 U/L
	serum	< 40 (37°C)	U/L	16.67	<670	nkat/L	XXO	10 nkat/L
Antibodies:								
Antibody to Centromeres	serum	negative at 1:40 dil.	highest pos. dil.	1	negative at 1:40 dil.	highest pos. dil.	1:XX	
Antibody to delta Hepatitis Virus	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Antibody to Hepatitis A Virus (IgG, IgM)	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Antibody to Hepatitis B core antigen	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Antibody to Hepatitis B surface antigen	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Antibody to Hepatitis C Virus	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Antibody to SS-A (Ro)	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Antibody to SS-B (La)	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Anti-DNA (native or double stranded)	serum	negative at 1:10 dil.	highest pos. dil.	1	negative at 1:10 dil.	highest pos. dil.	1:XX	
Anti-gastric Parietal Cell antibody	serum	negative at 1:20 dil.	highest pos. dil.	1	negative at 1:20 dil.	highest pos. dil.	1:XX	
Anti-glomerular Basement Membrane antibody	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Anti-HIV antibody	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Anti-mitochondrial antibody (AMA)	serum	negative at 1:20 dil.	highest pos. dil.	1	negative at 1:20 dil.	highest pos. dil.	1:XX	
Anti-neutrophil antibodies	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Anti-RNP antibodies	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Anti-Smith (Sm) antibody	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Anti-smooth Muscle antibody	serum	negative at 1:20 dil.	highest pos. dil.	1	negative at 1:20 dil.	highest pos. dil.	1:XX	
Anti-thyroid Colloid antibody	serum	negative at 1:10 dil.	highest pos. dil.	1	negative at 1:10 dil.	highest pos. dil.	1:XX	
Anti-thyroid Microsomal antibody	serum	negative at 1:10 dil.	highest pos. dil.	1	negative at 1:10 dil.	highest pos. dil.	1:XX	
Antihemophilic globulin (Coagulation Factor VIII)	plasma	50-200	%	0.01	0.50-2.00	fraction of 1.00	X.XX	0.01
Antinuclear Antibodies (ANA)	serum	negative at 1:10 dil.	highest pos. dil.	1	negative at 1:10 dil.	highest pos. dil.	1:XX	
Alpha-1-Antitrypsin	serum	150 - 350	mg/dL	0.01	1.5 - 3.5	g/L	X.X	0.1 g/L
Arginine, amino acid fractionation	plasma, serum	0.5 - 2.5	mg/dL	57.40	30 - 145	µmol/L	XXX	5 µmol/L
Arsenic								
as As	hair	<1	µg/g (ppm)	13.35	<13.0	nmol/g	XX.X	0.5 nmol/g
as As	urine	0 - 5	µg/24 hr	13.35	0 - 67	nmol/d	XX	1 nmol/d
as As2O3	urine	<25	µg/dL	0.05055	<1.3	µmol/L	XX.X	0.1 µmol/L
Ascorbate (as ascorbic acid)(Vitamin C)	plasma, serum	0.6 - 2.0	mg/dL	56.78	30 - 110	µmol/L	XXO	10 µmol/L
Asparagine, amino acid fractionation	plasma, serum	0.5 - 0.6	mg/dL	75.69	35 - 45	µmol/L	XXX	5 µmol/L
Aspartate Aminotransferase (AST, SGOT)	serum	0 - 35 (37°C)	Units/L	1	0 - 35	U/L	XX	1 U/L
	serum	0 - 35 (37°C)	Units/L	0.01667	0 - 0.58	µkat/L	O.XX	0.01 µkat/L
Aspartic acid, amino acid fractionation	plasma, serum	0.0 - 0.3	mg/dL	75.13	0 - 20	µmol/L	XXX	5 µmol/L

CONSTITUENT	FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR ---> MULT DIV <----	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
AST (aspartate aminotransferase, SGOT)	serum	0 - 35 (37°C)	Units/L	1	0 - 35	U/L	XX	1 U/L
	serum	0 - 35 (37°C)	Units/L	0.01667	0 - 0.58	µkat/L	OXX	0.01 µkat/L
Barbiturate - overdose, total expressed as:								
phenobarbital	serum	Depends on	mg/dL	43.06	Depends on	µmol/L	XX	5 µmol/L
sodium phenobarbital	serum	composition	mg/dL	39.34	composition	µmol/L	XX	5 µmol/L
barbitone	serum	of mixture	mg/dL	54.29	of mixture	µmol/L	XX	5 µmol/L
Barbiturate - therapeutic								
phenobarbital	N plasma, serum	2 - 5	mg/dL	43.06	85 - 215	µmol/L	XXX	5 µmol/L
pentobarbital	plasma, serum	20 - 40	mg/L	4.419	90 - 170	µmol/L	XXX	5 µmol/L
thiopental	plasma, serum	individual	mg/L	4.126	individual	µmol/L	XXX	5 µmol/L
Bence-Jones protein	urine	0	absent/present	1	0	absent/present	no digits	
Beta-Carotenes	serum	50 - 250	µg/dL	0.01863	0.9 - 4.6	µmol/L	X.X	0.1 µmol/L
Beta-Hydroxybutyrate (as beta-hydroxybutyric acid)	serum	<1.0	mg/dL	96.05	<100	µmol/L	XXO	10 µmol/L
Beta-2-Microglobulin <50 yrs	serum	0.80 - 2.40	mg/L	84.750	68 - 204	nmol/L	XXX	2 nmol/L
Beta-2-Microglobulin <50 yrs	urine	<140	µg/24 hr	0.08475	<12	nmol/d	XXX	2 nmol/d
Bicarbonate + CO2 (carbon dioxide content)	wh bld, plasma, serum	22 - 28	mEq/L	1	22 - 28	mmol/L	XX	1 mmol/L
Bile Acids								
Total	serum	trace - 3.3	µg/mL	2.547	trace - 8.4	µmol/L	X.X	0.2 µmol/L
Chenodeoxycholic acid	serum	trace - 1.3	µg/mL	2.547	trace - 3.4	µmol/L	X.X	0.2 µmol/L
Cholic acid	serum	trace - 1.0	µg/mL	2.448	trace - 2.4	µmol/L	X.X	0.2 µmol/L
Deoxycholic acid	serum	trace - 1.0	µg/mL	2.547	trace - 2.6	µmol/L	X.X	0.2 µmol/L
Lithocholic Acid	serum	trace	µg/mL	2.656	trace	µmol/L	X.X	0.2 µmol/L
Bile Acids (after cholecystokinin stimulation)								
Total	duodenal fluid	14.0 - 58.0	mg/mL	2.547	35.0 - 148.0	mmol/L	XX.X	0.2 mmol/L
Chendeoxycholic acid	duodenal fluid	4.0 - 24.0	mg/mL	2.547	10.0 - 61.4	mmol/L	XX.X	0.2 mmol/L
Cholic acid	duodenal fluid	2.4 - 33.0	mg/mL	2.448	6.8 - 81.0	mmol/L	XX.X	0.2 mmol/L
Deoxycholic acid	duodenal fluid	0.8 - 6.9	mg/mL	2.547	2.0 - 18.0	mmol/L	XX.X	0.2 mmol/L
Lithocholic Acid	duodenal fluid	0.3 - 0.8	mg/mL	2.656	0.8 - 2.0	mmol/L	XX.X	0.2 mmol/L
Bilirubin	N							
Total	serum	0.1 - 1.0	mg/dL	17.1	2 - 18	µmol/L	XX	2 µmol/L
Conjugated	serum	0 - 0.2	mg/dL	17.1	0 - 4	µmol/L	XX	2 µmol/L
Blood Gases								
pCO2	N art whole blood	35 - 45	mm Hg	0.1333	4.7 - 6.0	kPa	X.X	0.1 kPa
pH	art whole blood	7.35 - 7.45	pH units	1	7.35 - 7.45	pH units	X.XX	0.01
pO2	N art whole blood	75 - 100	mm Hg	0.1333	10.0 - 13.3	kPa	X.X	0.1 kPa
Blood Urea Nitrogen (BUN, urea nitrogen)	N plasma, serum	8 - 18	mg/dL	0.357	3.0 - 6.5	mmol/L of urea	X.X	0.5 mmol/L
Blood volume	patient	8.5 - 9.0	% body weight	9.4	80-85	mL/kg	XX	1 mL/kg

CONSTITUENT		FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR —> MULT DIV <—	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
Bromide, toxic									
as bromide ion		serum	> 120	mg/dL	0.1252	> 15	mmol/L	XX	1 mmol/L
as sodium bromide		serum	> 150	mg/dL	0.09719	> 15	mmol/L	XX	1 mmol/L
as sodium bromide		serum	> 15	mEq/L	1	> 15	mmol/L	XX	1 mmol/L
BUN (blood urea nitrogen, urea nitrogen)	N	plasma, serum	8 - 18	mg/dL	0.357	3.0 - 6.5	mmol/L of urea	X.X	0.5 mmol/L
C1 Esterase Inhibitor		serum	12 - 30	mg/dL	0.01	0.12-0.30	g/L	XX	1 g/L
C'3 (complement, C3)	N	serum	70 - 160	mg/dL	0.01	0.7 - 1.6	g/L	X.X	0.1 g/L
C'4 (complement, C4)	N	serum	20 - 40	mg/dL	0.01	0.2 - 0.4	g/L	X.X	0.1 g/L
Cadmium		serum	< 3	µg/dL	0.08897	< 0.27	µmol/L	X.XX	0.01 µmol/L
Calcitonin		serum	<100	pg/mL	1	<100	ng/L	XXO	10 ng/L
Calcium	N								
Male		serum	8.8 - 10.3	mg/dL	0.250	2.20 - 2.58	mmol/L	X.XX	0.02 mmol/L
Female <50 yr		serum	8.8 - 10.0	mg/dL	0.250	2.20 - 2.50	mmol/L	X.XX	0.02 mmol/L
Female >50 yr		serum	8.8 - 10.2	mg/dL	0.250	2.20 - 2.56	mmol/L	X.XX	0.02 mmol/L
All populations		serum	4.4 - 5.1	mEq/L	0.500	2.20 - 2.56	mmol/L	X.XX	0.02 mmol/L
Calcium, ionized	N								
All populations		wh bld, plsm, ser	2.00 - 2.30	mEq/L	0.500	1.00 - 1.15	mmol/L	X.XX	0.01 mmol/L
All populations		wh bld, plsm, ser	4.00 - 4.60	mg/dL	0.250	1.00 - 1.15	mmol/L	X.XX	0.01 mmol/L
Calcium, normal diet		urine	<250	mg/24 hr	0.02495	<6.2	mmol/d	X.X	0.1 mmol/d
cAMP (cyclic adenosine monophosphate)		plasma, serum	2.6 - 6.5	µg/L	3.038	8 - 20	nmol/L	XXX	1 nmol/L
cAMP (cyclic adenosine monophosphate)									
Total Urinary		urine	2.9 - 5.6	µmol/g of creatinine	113.1	330 - 630	nmol/mmol of creatinine	XXO	10 nmol/mmol of creatinine
Renal Tubular		urine	<2.5	µmol/g of creatinine	113.1	<280	nmol/mmol of creatinine	XXO	10 nmol/mmol of creatinine
Carbamazepine, therapeutic		plasma, serum	4 - 12	mg/L	4.233	17 - 51	µmol/L	XX	1 µmol/L
Carbon Dioxide Content [bicarb. + CO2]		wh bld, plasma, serum	22 - 28	mEq/L	1	22 - 28	mmol/L	XX	1 mmol/L
Carbon monoxide (proportion of Hb that is COHb)		plasma	<15	% saturation	0.01	< 0.15	fraction of 1.00	O.XX	0.01
Carcinoembryonic Antigen (CEA)		serum	< 3.0	ng/mL	1	< 3.0	µg/L	X.X	0.1 µg/L
Carotenes, beta		serum	50 - 250	µg/dL	0.01863	0.9 - 4.6	µmol/L	X.X	0.1 µmol/L
Catecholamines, total (as norepinephrine)		urine	< 100	µg/24 hr	5.911	< 590	nmol/d	XXO	10 nmol/d
CBC (Complete Blood Count)									
Hematocrit	N								
Female		whole blood	33 - 43	%	0.01	0.33 - 0.43	1	0.XX	0.01
Male		whole blood	39 - 49	%	0.01	0.39 - 0.49	1	0.XX	0.01
Hemoglobin									
Mass Concentration	N								
Female		whole blood	14.0 - 18.0	g/dL	10.0	140 - 180	g/L	XXX	1 g/L
Male		whole blood	11.5 - 15.5	g/dL	10.0	115 - 155	g/L	XXX	1 g/L

CONSTITUENT	FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR —> MULT DIV <—	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
CBC (Complete Blood Count) (continued)								
Hemoglobin								
Substance Concentration Hb [Fe]								
Female	whole blood	12.0 -15.0	g/dL	0.6206	7.45 - 9.30	mmol/L	XX.XX	0.05 mmol/L
Male	whole blood	13.6 - 17.2	g/dL	0.6206	8.45 - 10.65	mmol/L	XX.XX	0.05 mmol/L
Mean Corpuscular Hemoglobin (MCH)								
Mass	whole blood	27 - 33	pg	1	27 - 33	pg	XX	1 pg
Amount of substance Hb [Fe]	whole blood	27 - 33	pg	0.06206	1.70 - 2.05	fmol	X.XX	0.05 fmol
Mean Corpuscular Hemoglobin Conc. (MCHC)								
Mass Concentration	whole blood	33 - 37	g/dL	10	330 - 370	g/L	XXO	10 g/L
	whole blood	33 - 37	%	0.01	0.33 - 0.37	fraction of 1.00	0.XX	0.01
Amount of substance Hb[Fe]	whole blood	33 - 37	g/dL	0.6206	20 - 23	mmol/L	XXX	1 mmol/L
Mean Corpuscular Volume (MCV)	whole blood	76 - 100	µm^3	1	76 - 100	fL	XXX	1 fL
Platelet count	whole blood	130 - 400	10^3/mm^3	1	130 - 400	10^9/L	XXX	5 *10^9/L
RBC Count (erythrocyte count)								
Female	whole blood	3.5 - 5.0	10^6/mm^3	1	3.5 - 5.0	10^12/L	X.X	0.1 *10^12/L
Male	whole blood	4.3 - 5.9	10^6/mm^3	1	4.3 - 5.9	10^12/L	X.X	0.1 *10^12/L
WBC Count	whole blood	3.2 - 9.8	10^3/mm^3	1	3.2 - 9.8	10^9/L	XX.X	0.1 *10^9/L
WBC Differential								
Bands	whole blood	3 - 5	%	0.01	0.03 - 0.05	fraction of 1.00	0.XX	0.01
Neutrophils	whole blood	54 - 62	%	0.01	0.54 - 0.62	fraction of 1.00	0.XX	0.01
Lymphocytes	whole blood	25 - 33	%	0.01	0.25 - 0.33	fraction of 1.00	0.XX	0.01
Monocytes	whole blood	3 - 7	%	0.01	0.03 - 0.07	fraction of 1.00	0.XX	0.01
Eosinophils	whole blood	1 - 3	%	0.01	0.01 - 0.03	fraction of 1.00	0.XX	0.01
Basophils	whole blood	0 - 0.75	%	0.01	0 - 0.0075	fraction of 1.00	0.XXXX	0.0001
Bands	whole blood	150 - 400	cells/mm^3 (µL)	1	150 - 400	10^6 cells / L	XXX	1 * 10^6 cells/L
Neutrophils	whole blood	3000 - 5800	cells/mm^3 (µL)	1	3000 - 5800	10^6 cells / L	XXXX	1 * 10^6 cells/L
Lymphocytes	whole blood	1500 - 3000	cells/mm^3 (µL)	1	1500 - 3000	10^6 cells / L	XXXX	1 * 10^6 cells/L
Monocytes	whole blood	285 - 500	cells/mm^3 (µL)	1	285 - 500	10^6 cells / L	XXX	1 * 10^6 cells/L
Eosinophils	whole blood	50 - 250	cells/mm^3 (µL)	1	50 - 250	10^6 cells / L	XXX	1 * 10^6 cells/L
Basophils	whole blood	15 - 50	cells/mm^3 (µL)	1	15 - 50	10^6 cells / L	XX	1 * 10^6 cells/L
CEA (Carcinoembryonic Antigen)	serum	< 3.0	ng/mL	1	< 3.0	µg/L	X.X	0.1 µg/L
Ceruloplasmin	serum	20 - 35	mg/dL	10	200 - 350	mg/L	XXO	10 mg/L
cGMP (cyclic guanine monophosphate)	plasma	0.6 - 3.5	µg/L	2.897	1.7 - 10.1	nmol/L	XX.X	0.1 nmol/L
cGMP (cyclic guanine monophosphate)	urine	0.3 - 1.8	µmol/g of creatinine	113.1	30 - 200	nmol/mmol of creatinine	XXO	10 nmol/mmol of creatinine
CH50 (Hemolytic Complement, Total)	serum	150-250	units/mL	1	150-250	arb unit	XXX	1 unit
Chloramphenicol, therapeutic	serum	10 - 20	µg/mL	3.1	31.0 - 62.0	µmol/L	XX.X	0.1 µmol/L
Chlordiazepoxide								
Therapeutic	plasma, serum	0.5 - 5.0	mg/L	3.336	2 - 17	µmol/L	XX	1 µmol/L
Toxic	plasma, serum	>10.0	mg/L	3.336	>33	µmol/L	XX	1 µmol/L

CONSTITUENT	FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR ⟶ MULT DIV ⟵	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
Chloride	plasma, serum	95 - 105	mEq/L	1	95 - 105	mmol/L	XXX	1 mmol/L
Chloride	CSF	120-130	mEq/L	1	120-130	mmol/L	XXX	1 mmol/L
Chlorimipramine (includes desmethyl metabolite), therapeutic	plasma, serum	50 - 400	ng/mL	3.176	150 - 1270	nmol/L	XXO	10 nmol/L
Chlorpromazine, therapeutic	plasma, serum	50 - 300	ng/mL	3.136	150 - 950	nmol/L	XXO	10 nmol/L
Chlorpropamide, therapeutic	plasma, serum	75 - 250	mg/L	3.513	270 - 900	µmol/L	XXO	10 µmol/L
Cholecalciferol (vitamin D3)	serum	24 - 40	ng/mL	2.599	60 - 105	nmol/L	XXX	5 nmol/L
25-OH-cholecalciferol	serum	18 - 36	ng/mL	2.496	45 - 90	nmol/L	XXX	5 nmol/L
Cholestanol (as a fraction of total cholesterol)	plasma, serum	1 - 3	%	0.01	0.01 - 0.03	fraction of 1.00	O.XX	0.01
Cholesterol, HDL (high density lipoproteins) N								
Male	plasma, serum	30 - 70	mg/dL	0.02586	0.80 - 1.80	mmol/L	X.XX	0.05 mmol/L
Female	plasma, serum	30 - 90	mg/dL	0.02586	0.80 - 2.35	mmol/L	X.XX	0.05 mmol/L
Cholesterol, LDL(low density lipoproteins) N	plasma, serum	50 - 190	mg/dL	0.02586	1.30 - 4.90	mmol/L	X.XX	0.05 mmol/L
Cholesterol, total N								
<29 yr	plasma, serum	<200	mg/dL	0.02586	<5.20	mmol/L	X.XX	0.05 mmol/L
30 - 39 yr	plasma, serum	<225	mg/dL	0.02586	<5.85	mmol/L	X.XX	0.05 mmol/L
40 - 49 yr	plasma, serum	<245	mg/dL	0.02586	<6.35	mmol/L	X.XX	0.05 mmol/L
>50 yr	plasma, serum	<265	mg/dL	0.02586	<6.85	mmol/L	X.XX	0.05 mmol/L
Cholesterol esters (as a fraction of total cholesterol)	plasma, serum	60-75	%	0.01	0.60-0.75	fraction of 1.00	O.XX	0.01
Cholinesterase	plasma, serum	620-1370 (25°C)	Units/L	1	620 - 1370	U/L	XXXO	10 U/L
	plasma, serum	620-1370 (25°C)	Units/L	0.01667	10.3 - 22.8	µkat/L	XX.X	0.1 µkat/L
Chorionic gonadotropin (HCG)	serum	< 10 if not pregnant	mIU/mL	1	< 10 if not pregnant	IU/L	XX	1 IU/L
Chorionic gonadotropin (HCG)	urine	negative	neg/pos	1	negative	neg/pos	no digits	
Citrate (as citric acid)	serum	1.2 - 3.0	mg/dL	52.05	60 - 160	µmol/L	XXX	5 µmol/L
Citrulline, amino acid fractionation	plasma, serum	0.2 - 1.0	mg/dL	57.08	15 - 55	µmol/L	XXX	5 µmol/L
CK, (Creatine phosphokinase, creatine kinase)								
	serum	0 - 150 (37°C)	Units/L	1	0 - 150	U/L	XXX	1 U/L
	serum	0 - 150 (37°C)	Units/L	0.01667	0 - 2.50	µkat/L	X.XX	0.01 µkat/L
CK (Creatine kinase) isoenzymes, MB fraction	serum	> 5 % in myocardial infarction	%	0.01	>0.05	fraction of 1.00	O.XX	0.01
CO2 (carbon dioxide content, bicarb. + CO2)	wh bld, plasma, serum	22 - 28	mEq/L	1	22 - 28	mmol/L	XX	1 mmol/L
Clot retraction	plasma	50-100	% @ 2 hours	0.01	0.50 - 1.00	fraction of 1.00	0.XX	0.01
Coagulation Factor I (fibrinogen)	plasma	0.15 - 0.35	g/dL	29.41	4.4 - 10.3	µmol/L	XX.X	0.1 µmol/L
	plasma	150 - 350	mg/dL	0.01	1.5 - 3.5	g/L	X.X	0.1 g/L
Coagulation Factor II (prothrombin)	plasma	70 -130	%	0.01	0.70-1.30	fraction of 1.00	X.XX	0.01
Coagulation Factor V	plasma	70 -130	%	0.01	0.70-1.30	fraction of 1.00	X.XX	0.01
Coagulation Factor VII	plasma	60 - 140	%	0.01	0.60 - 1.40	fraction of 1.00	X.XX	0.01
Coagulation Factor VIII C	plasma	50 - 200	%	0.01	0.50 - 2.00	fraction of 1.00	X.XX	0.01
Coagulation Factor VIII VW (RCoF, Ristocetin Cofactor, von Willebrand Factor)	plasma	50 - 150	%	0.01	0.50 - 1.50	fraction of 1.00	X.XX	0.01

CONSTITUENT		FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR ⟶ MULT DIV ⟵	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
Coagulation Factor IX		plasma	70 -130	%	0.01	0.70-1.30	fraction of 1.00	X.XX	0.01
Coagulation Factor X		plasma	70 -130	%	0.01	0.70-1.30	fraction of 1.00	X.XX	0.01
Coagulation Factor XI		plasma	70 -130	%	0.01	0.70-1.30	fraction of 1.00	X.XX	0.01
Coagulation Factor XII		plasma	70 -130	%	0.01	0.70-1.30	fraction of 1.00	X.XX	0.01
Complement - hemolytic total (CH50)		serum	150 - 250	units/mL	1	150-250	arb unit	XXX	1 unit
Complement Component 3	N	serum	70 - 160	mg/dL	0.01	0.7 - 1.6	g/L	X.X	0.1 g/L
Complement Component 4	N	serum	20 - 40	mg/dL	0.01	0.2 - 0.4	g/L	X.X	0.1 g/L
Complete Blood Count (CBC)									
Hematocrit	N								
Female		whole blood	33 - 43	%	0.01	0.33 - 0.43	1	0.XX	0.01
Male		whole blood	39 - 49	%	0.01	0.39 - 0.49	1	0.XX	0.01
Hemoglobin									
Mass Concentration	N								
Female		whole blood	14.0 - 18.0	g/dL	10.0	140 - 180	g/L	XXX	1 g/L
Male		whole blood	11.5 - 15.5	g/dL	10.0	115 - 155	g/L	XXX	1 g/L
Substance Concentration Hb [Fe]									
Female		whole blood	12.0 -15.0	g/dL	0.6206	7.45 - 9.30	mmol/L	XX.XX	0.05 mmol/L
Male		whole blood	13.6 - 17.2	g/dL	0.6206	8.45 - 10.65	mmol/L	XX.XX	0.05 mmol/L
Mean Corpuscular Hemoglobin (MCH)									
Mass		whole blood	27 - 33	pg	1	27 - 33	pg	XX	1 pg
Amount of substance Hb [Fe]		whole blood	27 - 33	pg	0.06206	1.70 - 2.05	fmol	X.XX	0.05 fmol
Mean Corpuscular Hemoglobin Conc. (MCHC)									
Mass Concentration		whole blood	33 - 37	g/dL	10	330 - 370	g/L	XXO	10 g/L
		whole blood	33 - 37	%	0.01	0.33 - 0.37	fraction of 1.00	0.XX	0.01
Amount of substance Hb[Fe]		whole blood	33 - 37	g/dL	0.6206	20 - 23	mmol/L	XXX	1 mmol/L
Mean Corpuscular Volume (MCV)		whole blood	76 - 100	µm^3	1	76 - 100	fL	XXX	1 fL
Platelet count		whole blood	130 - 400	10^3/mm^3	1	130 - 400	10^9/L	XXX	5 •10^9/L
RBC Count (erythrocyte count)									
Female		whole blood	3.5 - 5.0	10^6/mm^3	1	3.5 - 5.0	10^12/L	X.X	0.1 • 10^12/L
Male		whole blood	4.3 - 5.9	10^6/mm^3	1	4.3 - 5.9	10^12/L	X.X	0.1 • 10^12/L
WBC Count		whole blood	3.2 - 9.8	10^3 / mm^3	1	3.2 - 9.8	10^9/L	XX.X	0.1 • 10^9/L
WBC Differential									
Bands		whole blood	3 - 5	%	0.01	0.03 - 0.05	fraction of 1.00	0.XX	0.01
Neutrophils		whole blood	54 - 62	%	0.01	0.54 - 0.62	fraction of 1.00	0.XX	0.01
Lymphocytes		whole blood	25 - 33	%	0.01	0.25 - 0.33	fraction of 1.00	0.XX	0.01
Monocytes		whole blood	3 - 7	%	0.01	0.03 - 0.07	fraction of 1.00	0.XX	0.01
Eosinophils		whole blood	1 - 3	%	0.01	0.01 - 0.03	fraction of 1.00	0.XX	0.01
Basophils		whole blood	0 - 0.75	%	0.01	0 - 0.0075	fraction of 1.00	0.XXXX	0.0001
Bands		whole blood	150 - 400	cells/mm^3 (µL)	1	150 - 400	10^6 cells / L	XXX	1 • 10^6 cells/L
Neutrophils		whole blood	3000 - 5800	cells/mm^3 (µL)	1	3000 - 5800	10^6 cells / L	XXXX	1 • 10^6 cells/L
Lymphocytes		whole blood	1500 - 3000	cells/mm^3 (µL)	1	1500 - 3000	10^6 cells / L	XXXX	1 • 10^6 cells/L

CONSTITUENT		FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR → MULT. DIV ←	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
Complete Blood Count (CBC) (continued)									
WBC Differential									
Monocytes		whole blood	285 - 500	cells/mm^3 (µL)	1	285 - 500	10^6 cells / L	XXX	1 · 10^6 cells/L
Eosinophils		whole blood	50 - 250	cells/mm^3 (µL)	1	50 - 250	10^6 cells / L	XXX	1 · 10^6 cells/L
Basophils		whole blood	15 - 50	cells/mm^3 (µL)	1	15 - 50	10^6 cells / L	XX	1 · 10^6 cells/L
Copper (Copper (II), Cu)		serum	70 - 140	µg/dL	0.1574	11.0 - 22.0	µmol/L	XX.X	0.2 µmol/L
Copper (Copper (II), Cu)		urine	<40	µg/24 hr	0.01574	<0.6	µmol/d	X.X	0.2 µmol/d
Coproporphyrin		urine	<200	µg/24 hr	1.527	<300	nmol/d	XXO	10 nmol/d
Corticotropin (ACTH)	N	plasma	20 - 100	pg/mL	0.2202	4 - 22	pmol/L	XX	1 pmol/L
Cortisol	N								
0800 hr		plasma, serum	4 - 19	µg/dL	27.59	110 - 520	nmol/L	XXO	10 nmol/L
1800 hr		plasma, serum	2 - 15	µg/dL	27.59	50 - 410	nmol/L	XXO	10 nmol/L
2400 hr		plasma, serum	<5	µg/dL	27.59	<140	nmol/L	XXO	10 nmol/L
Cortisol, free	N	urine	10 - 110	µg/24 hr	2.759	30 - 300	nmol/d	XXO	10 nmol/d
Creatine									
Male		serum	0.17 - 0.50	mg/dL	76.25	10 - 40	µmol/L	X0	10 µmol/L
Female		serum	0.35 - 0.93	mg/dL	76.25	30 - 70	µmol/L	X0	10 µmol/L
Creatine									
Male		urine	0 - 40	mg/24 hr	7.625	0 - 300	µmol/d	XXO	10 µmol/d
Female		urine	0 - 60	mg/24 hr	7.625	0 - 600	µmol/d	XXO	10 µmol/d
Creatine kinase (CK, creatine phosphokinase)									
		serum	0 - 150 (37°C)	Units/L	1	0 - 150	U/L	XXX	1 U/L
		serum	0 - 150 (37°C)	Units/L	0.01667	0 - 2.50	µkat/L	X.XX	0.01 µkat/L
Creatine kinase isoenzymes, MB fraction		plasma, serum	> 5 % in myocardial infarction	%	0.01	>0.05	fraction of 1.00	0.XX	0.01
Creatinine	N	plasma, serum	0.6 - 1.2	mg/dL	88.4	50 - 110	µmol/L	XXO	10 µmol/L
Creatinine	N								
Male		urine	20 - 26	mg/kg/24hr	0.0088	0.18 - 0.23	mmol/kg/d	X.XX	0.01 mmol/kg/d
		urine	1.0 - 2.0	g/24hr	8.8	8.8 - 17.6	mmol/d	XX.X	0.1 mmol/d
Female		urine	14 - 22	mg/kg/24hr	0.0088	0.12 - 0.19	mmol/kg/d	X.XX	0.01 mmol/kg/d
		urine	0.8 - 1.8	g/24hr	8.8	7.0 - 15.8	mmol/d	XX.X	0.1 mmol/d
Creatinine clearance	N	plsm, ser. & urine	75 - 125	mL/min	0.01667	1.24 - 2.08	mL/s	X.XX	0.02 mL/s
creatinine clearance corrected for body surface area = µmol/L (urine creatinine) / µmol/L (serum creatinine) · mL/s · 1.73 / A [where A is the body surface area in square meters]									
Cryoglobulins		serum	0	neg/pos	1	0	neg/pos	no digits	
Cyanide, lethal		plasma	>0.10	mg/dL	384.3	>40	µmol/L	XXX	5 µmol/L
Cyanocobalamin (vitamin B12)		serum	200 - 1000	pg/mL	0.7378	150 - 750	pmol/L	XXO	10 pmol/L
		serum	20 - 100	ng/dL	7.378	150 - 750	pmol/L	XXO	10 pmol/L
Cyclic adenosine monophosphate (cAMP)		plasma	2.6 - 5.6	µg/L	3.038	8 - 20	nmol/L	XXX	1 nmol/L

CONSTITUENT	FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR ⟶ MULT DIV ⟵	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
Cyclic adenosine monophosphate (cAMP)								
Total Urinary	urine	2.9 - 5.6	µmol/g of creatinine	113.1	330 - 630	nmol/mmol of creatinine	XXO	10 nmol/mmol of creatinine
Renal Tubular	urine	<2.5	µmol/g of creatinine	113.1	<280	nmol/mmol of creatinine	XXO	10 nmol/mmol of creatinine
Cyclic guanine monophosphate (cGMP)	plasma, serum	0.6 - 3.5	µg/L	2.897	1.7 - 10.1	nmol/L	XX.X	0.1 nmol/L
Cyclic guanine monophosphate (cGMP)	urine	0.3 - 1.8	µmol/g of creatinine	113.1	30 - 200	nmol/mmol of creatinine	XXO	10 nmol/mmol of creatinine
Cystine, amino acid fractionation	plasma, serum	0.2 - 2.2	mg/dL	41.61	10 - 90	µmol/L	XXX	5 µmol/L
Cystine	urine	10 - 100	mg/24 hr	4.161	40 - 420	µmol/d	XXO	10 µmol/d
Dehydroepiandrosterone (DHEA)								
1 - 4 years	plasma, serum	0.2 - 0.4	µg/L	3.467	0.6 - 1.4	nmol/L	XX.X	0.2 nmol/L
4 - 8 years	plasma, serum	0.1 - 1.9	µg/L	3.467	0.4 - 6.6	nmol/L	XX.X	0.2 nmol/L
8 - 10 years	plasma, serum	0.2 - 2.9	µg/L	3.467	0.6 - 10.0	nmol/L	XX.X	0.2 nmol/L
10 - 12 years	plasma, serum	0.5 - 9.2	µg/L	3.467	1.8 - 31.8	nmol/L	XX.X	0.2 nmol/L
12 - 14 years	plasma, serum	0.9 - 20.0	µg/L	3.467	3.2 - 69.4	nmol/L	XX.X	0.2 nmol/L
14 - 16 years	plasma, serum	2.5 - 20.0	µg/L	3.467	8.6 - 69.4	nmol/L	XX.X	0.2 nmol/L
Premenopausal female	plasma, serum	2.0 - 15.0	µg/L	3.467	7.0 - 52.0	nmol/L	XX.X	0.2 nmol/L
Male	plasma, serum	0.8 - 10.0	µg/L	3.467	2.8 - 34.6	nmol/L	XX.X	0.2 nmol/L
Dehydroepiandrosterone (ketosteroid fractions)								
Female	urine	0.2 - 1.8	mg/24 hr	3.467	1 - 6	µmol/d	XX	1 µmol/d
Male	urine	0.2 - 2.0	mg/24 hr	3.467	1 - 7	µmol/d	XX	1 µmol/d
Dehydroepiandrosterone sulphate (DHEA-S)								
newborn	plasma, serum	1670 - 3640	ng/mL	0.002714	4.5 - 9.9	µmol/L	XX.X	0.1 µmol/L
pre-pubertal children	plasma, serum	100 - 600	ng/mL	0.002714	0.3 - 1.6	µmol/L	XX.X	0.1 µmol/L
male	plasma, serum	2000 - 3350	ng/mL	0.002714	5.4 - 9.1	µmol/L	XX.X	0.1 µmol/L
female (premenopausal)	plasma, serum	820 - 3380	ng/mL	0.002714	2.2 - 9.2	µmol/L	XX.X	0.1 µmol/L
female (post-menopausal)	plasma, serum	110 - 610	ng/mL	0.002714	0.3 - 1.7	µmol/L	XX.X	0.1 µmol/L
pregnancy (term)	plasma, serum	230 - 1170	ng/mL	0.002714	0.6 - 3.2	µmol/L	XX.X	0.1 µmol/L
Delta-Aminolevulinate (as aminolevulinic acid)	urine	1.0 - 7.0	mg/24 hr	7.626	8 - 53	µmol/d	XX	1 µmol/d
11-Deoxycortisol	plasma	0 - 2	µg/dL	28.86	0 - 60	nmol/L	XXO	10 nmol/L
Desipramine, therapeutic	plasma, serum	50 - 200	ng/mL	3.754	170 - 700	nmol/L	XXO	10 nmol/L
Desmethlysuximide, therapeutic	plasma, serum	10 - 40	mg/L	5.285	50 - 210	µmol/L	XXO	10 µmol/L
Diazepam N								
Therapeutic	plasma, serum	0.1 - 0.25	mg/L	3512	350 - 900	nmol/L	XXO	10 nmol/L
Toxic	plasma, serum	>1.0	mg/L	3512	>3510	nmol/L	XXO	10 nmol/L
Dicoumarol, therapeutic	plasma, serum	8 - 30	mg/L	2.974	25 - 90	µmol/L	XX	5 µmol/L
Dilantin, (Diphenylhydantoin, Phenytoin) N								
Therapeutic	plasma, serum	10 - 20	mg/L	3.964	40 - 80	µmol/L	XX	5 µmol/L
Toxic	plasma, serum	>30	mg/L	3.964	>120	µmol/L	XXX	5 µmol/L

CONSTITUENT	FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR ---> MULT DIV <----	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
Digoxin	N							
Therapeutic	plasma, serum	0.5 - 2.2	ng/mL	1.281	0.6 - 2.8	nmol/L	X.X	0.1 nmol/L
	plasma, serum	0.5 - 2.2	µg/L	1.281	0.6 - 2.8	nmol/L	X.X	0.1 nmol/L
Toxic	plasma, serum	>2.5	ng/mL	1.281	>3.2	nmol/L	X.X	0.1 nmol/L
Dimethadione, therapeutic	plasma, serum	<1	g/L	7.745	<7.7	mmol/L	X.X	0.1 mmol/L
Diphenylhydantoin (phenytoin)	N							
Therapeutic	plasma, serum	10 - 20	mg/L	3.964	40 - 80	µmol/L	XX	5 µmol/L
Toxic	plasma, serum	>30	mg/L	3.964	>120	µmol/L	XX	5 µmol/L
Disopyramide, therapeutic	plasma, serum	2.0 - 6.0	mg/L	2.946	6 - 18	µmol/L	XX	1 µmol/L
Doxepin, therapeutic	plasma, serum	50 - 200	ng/mL	3.579	180 - 720	nmol/L	XXO	10 nmol/L
D-Xylose (25 g dose)	plasma, serum	30 - 40 (30-60 min)	mg/dL	0.06661	2.0 - 2.7 (30-60 min)	mmol/L	X.X	0.1 mmol/L
D-Xylose excretion (25 g dose)	urine (excreted in 5 hr)	21 - 31	%	0.01	0.21 - 0.31 (excreted in 5 hr)	fraction of 1.00	O.XX	0.01
Electrolytes								
Chloride	plasma, serum	95 - 105	mEq/L	1	95 - 105	mmol/L	XXX	1 mmol/L
CO2	wh bld, plsm, ser	22 - 28	mEq/L	1	22 - 28	mmol/L	XX	1 mmol/L
Potassium	plasma, serum	3.5-5.0	mEq/L	1	3.5 - 5.0	mmol/L	X.X	0.1 mmol/L
Sodium	plasma, serum	135 - 147	mEq/L	1	135 - 147	mmol/L	XXX	1 mmol/L
Electrophoresis, protein								
Albumin	serum	60 - 65	%	0.01	0.60 - 0.65	fraction of 1.00	O.XX	0.01
Alpha 1 Globulin	serum	1.7 - 5.0	%	0.01	0.02 - 0.05	fraction of 1.00	O.XX	0.01
Alpha 2 Globulin	serum	6.7 - 12.5	%	0.01	0.07 - 0.13	fraction of 1.00	O.XX	0.01
Beta Globulin	serum	8.3 - 16.3	%	0.01	0.08 - 0.16	fraction of 1.00	O.XX	0.01
Gamma Globulin	serum	10.7 - 20.0	%	0.01	0.11 - 0.20	fraction of 1.00	O.XX	0.01
Albumin	serum	3.6 - 5.2	g/dL	10.0	36 - 52	g/L	XX	1 g/L
Alpha 1 Globulin	serum	0.1 - 0.4	g/dL	10.0	1 - 4	g/L	XX	1 g/L
Alpha 2 Globulin	serum	0.4 - 1.0	g/dL	10.0	4 - 10	g/L	XX	1 g/L
Beta Globulin	serum	0.5 - 1.2	g/dL	10.0	5 - 12	g/L	XX	1 g/L
Gamma Globulin	serum	0.6 - 1.6	g/dL	10.0	6 - 16	g/L	XX	1 g/L
Electrophoresis, Protein	urine	no monoclonal paraproteins	neg/pos	1	no monoclonal paraproteins	neg/pos	no digits	
Epinephrine	plasma	31 - 95 (at rest for 15 min)	pg/mL	5.458	170 - 520 (at rest for 15 min)	pmol/L	XXO	10 pmol/L
Epinephrine	urine	<10	µg/24 hr	5.458	<55	nmol/d	XX	5 nmol/d
Erythrocyte count (RBC count)								
Female	whole blood	3.5 - 5.0	10^6/mm^3	1	3.5 - 5.0	10^12/L	X.X	0.1 - 10^12/L
Male	whole blood	4.3 - 5.9	10^6/mm^3	1	4.3 - 5.9	10^12/L	X.X	0.1 - 10^12/L
Erythrocyte count (RBC count)	CSF	0	per mm^3	1	0	10^6/L	XX	1 10^6/L
Erythrocyte Sedimentation Rate (ESR)								
Female	whole blood	0 - 30	mm/hr	1	0 - 30	mm/hr	XX	1 mm/hr

CONSTITUENT	FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR → MULT DIV ←	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
Erythrocyte Sedimentation Rate (ESR) (continued)								
Male	whole blood	0 - 20	mm/hr	1	0 - 20	mm/hr	XX	1 mm/hr
Estradiol, (as estrogens)								
Female	N							
Peak production	plasma, serum	20 - 300	pg/mL	3.671	70 - 1100	pmol/L	XXXO	10 pmol/L
Male	plasma, serum	200 - 800	pg/mL	3.671	750 - 2900	pmol/L	XXXO	10 pmol/L
	plasma, serum	<50	pg/mL	3.671	<180	pmol/L	XXO	10 pmol/L
Estriol (nonpregnant)								
Onset of menstruation	urine	4 - 25	µg/24 hr	3.468	15 - 85	nmol/d	XXX	5 nmol/d
Ovulation peak	urine	28 - 99	µg/24 hr	3.468	95 - 345	nmol/d	XXX	5 nmol/d
Luteal peak	urine	22 - 105	µg/24 hr	3.468	75 - 365	nmol/d	XXX	5 nmol/d
Menopausal women	urine	1.4 - 19.6	µg/24 hr	3.468	5 - 70	nmol/d	XXX	5 nmol/d
Male	urine	5 - 18	µg/24 hr	3.468	15 - 60	nmol/d	XXX	5 nmol/d
Estrogens (as estradiol)								
Female								
Peak production	plasma, serum	20 - 300	pg/mL	3.671	70 - 1100	pmol/L	XXXO	10 pmol/L
Male	plasma, serum	200 - 800	pg/mL	3.671	750 - 2900	pmol/L	XXXO	10 pmol/L
	plasma, serum	<50	pg/mL	3.671	<180	pmol/L	XXO	10 pmol/L
Estrogens, placental (as estriol)	urine	gestation dependent	mg/24 hr	3.468	gestation dependent	µmol/d	XXX	1 µmol/d
Estrogen receptors								
Negative Result	tissue	0 - 3	fmol of estradiol bound/mg of cytosol protein	1	0 - 3	fmol of estradiol bound/mg of cytosol protein	XXX	1 fmol/mg of protein
Doubtful Result	tissue	4 - 10	fmol of estradiol bound/mg of cytosol protein	1	4 - 10	fmol of estradiol bound/mg of cytosol protein	XXX	1 fmol/mg of protein
Positive Result	tissue	>10	fmol of estradiol bound/mg of cytosol protein	1	>10	fmol of estradiol bound/mg of cytosol protein	XXX	1 fmol/mg of protein
Estrone								
Female, 1-10 days of cycle	plasma, serum	43 - 180	pg/mL	3.699	160 - 665	pmol/L	XXX	5 pmol/L
Female, 11-20 days of cycle	plasma, serum	75 - 196	pg/mL	3.699	275 - 725	pmol/L	XXX	5 pmol/L
Female, 20-29 days of cycle	plasma, serum	131 - 201	pg/mL	3.699	485 - 745	pmol/L	XXX	5 pmol/L
Male	plasma, serum	29 - 75	pg/mL	3.699	105 - 275	pmol/L	XXX	5 pmol/L
Estrone, female	urine	2 - 25	µg/24 hr	3.699	5 - 90	nmol/d	XXX	5 nmol/d
Ethanol, toxic (ethyl alcohol)	N plasma, serum	>100	mg/dL	0.2171	>22	mmol/L	XX	1 mmol/L
Ethchlorvynol, therapeutic	plasma, serum	< 40	mg/L	6.915	< 280	µmol/L	XXO	10 µmol/L
Ethyl Alcohol, toxic (ethanol)	N plasma, serum	>100	mg/dL	0.2171	>22	mmol/L	XX	1 mmol/L
Etiocholanolone								
Female	urine	0.8 - 4.0	mg/24 hr	3.443	2 - 14	µmol/d	XX	1 µmol/d
Male	urine	1.4 - 5.0	mg/24 hr	3.443	4 - 17	µmol/d	XX	1 µmol/d
Ethosuximide, therapeutic	plasma, serum	40 - 110	mg/L	7.084	280 - 780	µmol/L	XXO	10 µmol/L

CONSTITUENT	FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR —> MULT DIV <—	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
Ethylene glycol, toxic	plasma, serum	>30	mg/dL	0.1611	>5	mmol/L	XX	1 mmol/L
Factor I (fibrinogen)	plasma	0.15-0.35	g/dL	29.41	4.4 - 10.3	µmol/L	XX.X	0.1 µmol/L
	plasma	150 - 350	mg/dL	0.01	1.5 - 3.5	g/L	X.X	0.1 g/L
Factor II (prothrombin)	plasma	70 -130	%	0.01	0.70 -1.30	fraction of 1.00	X.XX	0.01
Factor V	plasma	70 -130	%	0.01	0.70 -1.30	fraction of 1.00	X.XX	0.01
Factor VII	plasma	60 - 140	%	0.01	0.60 - 1.40	fraction of 1.00	X.XX	0.01
Factor VIII C	plasma	50 - 200	%	0.01	0.50 - 2.00	fraction of 1.00	X.XX	0.01
Factor VIII VW (Ristocetin Cofactor, von Willebrand Factor)	plasma	50 - 150	%	0.01	0.50 - 1.50	fraction of 1.00	X.XX	0.01
Factor IX	plasma	70 -130	%	0.01	0.70 -1.30	fraction of 1.00	X.XX	0.01
Factor X	plasma	70 -130	%	0.01	0.70 -1.30	fraction of 1.00	X.XX	0.01
Factor XI	plasma	70 -130	%	0.01	0.70 -1.30	fraction of 1.00	X.XX	0.01
Factor XII	plasma	70 -130	%	0.01	0.70 -1.30	fraction of 1.00	X.XX	0.01
Fatty Acids, nonesterified	plasma	8 - 20	mg/dL	10	80 - 200	mg/L	XXO	10 mg/L
	plasma	8 - 20	mg/dL	0.01	0.08 - 0.20	g/L	X.XX	0.01 g/L
Fecal fat (as stearic acid)	feces	2.0 - 6.0	g/24 hr	3.515	7 - 21	mmol/d	XX	1 mmol/d
Ferritin	plasma, serum	18 - 300	ng/mL	1	18 - 300	µg/L	XXO	10 µg/L
Fetal hemoglobin (Hemoglobin F)	whole blood	<2	%	0.01	<0.02	fraction of 1.00	O.XX	0.01
alpha-Fetoprotein	amniotic fluid	gestation dependent	mg/dL	10	gestation dependent	mg/L	XX	1 mg/L
alpha-Fetoprotein	serum	0 - 20	ng/mL	1	0 - 20	µg/L	XX	1 µg/L
Fibrinogen (coagulation factor I)	plasma	0.15-0.35	g/dL	29.41	4.4 - 10.3	µmol/L	XX.X	0.1 µmol/L
	plasma	150 - 350	mg/dL	0.01	1.5 - 3.5	g/L	X.X	0.1g/L
Fibrin(ogen) Split Products	serum	<10	µg/mL	1	<10	mg/L	XX	1 mg/L
5'Nucleotidase	plasma, serum	2 - 17 (37°C)	U/L	1	2 - 17	U/L	XX	1 U/L
	plasma, serum	2 - 17 (37°C)	U/L	0.01667	0.03 - 0.28	µkat/L	X.XX	0.01 µkat/L
Fluoride	urine	<1.0	mg/24 hr	52.63	<50	µmol/d	XXO	10 µmol/d
Folate (folic acid, pteroylglutamic acid) N	serum	2 - 10	ng/mL	2.266	4 - 22	nmol/L	XX	2 nmol/L
	serum	0.2 - 1.0	µg/dL	22.66	4 - 22	nmol/L	XX	2 nmol/L
Folate	RBC	140 - 960	ng/mL	2.266	317 - 2175	nmol/L	XXO	10 nmol/L
Follicle Stimulating Hormone (FSH)								
Female	plasma, serum	2.0 - 15.0	mIU/mL	1	2 - 15	IU/L	XX	1 IU/L
Peak Production - Female	plasma, serum	20 - 50	mIU/mL	1	20 - 50	IU/L	XX	1 IU/L
Male	plasma, serum	1.0 - 10.0	mIU/mL	1	1 - 10	IU/L	XX	1 IU/L
Follicle Stimulating Hormone (FSH)								
Follicular phase	urine	2 - 15	IU/24 hr	1	2 - 15	IU/d	XXX	1 IU/d
Midcycle	urine	8 - 40	IU/24 hr	1	8 - 40	IU/d	XXX	1 IU/d
Luteal phase	urine	2 - 10	IU/24 hr	1	2 - 10	IU/d	XXX	1 IU/d
Menopausal women	urine	35 - 100	IU/24 hr	1	35 - 100	IU/d	XXX	1 IU/d
Male	urine	2 - 15	IU/24 hr	1	2 - 15	IU/d	XXX	1 IU/d
Fructose	plasma	<10	mg/dL	0.05551	< 0.55	mmol/L	X.XX	0.05 mmol/L
Galactose (children)	plasma	<20	mg/dL	0.05551	<1.10	mmol/L	X.XX	0.05 mmol/L

CONSTITUENT		FLUID	APPROXIMATE NORMAL RANGE	UNITS	CONVERSION FACTOR → MULT / DIV ←	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
Gamma Glutamyl Transferase (GGT)		serum	0 - 30 (30°C)	Units/L	1	0 - 30	U/L	XX	1 U/L
		serum	0 - 30 (30°C)	Units/L	0.01667	0 - 0.50	µkat/L	X.XX	0.01 µkat/L
Gases (arterial)									
pCO2	N	art whole blood	35 - 45	mm Hg	0.1333	4.7 - 6.0	kPa	X.X	0.1 kPa
pH		art whole blood	7.35 - 7.45	pH units	1	7.35 - 7.45	pH units	X.XX	0.01
pO2	N	art whole blood	75 - 100	mm Hg	0.1333	10.0 - 13.3	kPa	X.X	0.1 kPa
Gastrin		plasma, serum	0 - 180	pg/mL	1	0 - 180	ng/L	XXO	10 ng/L
GGT (Gamma Glutamyl Transferase)		serum	0 - 30 (30°C)	Units/L	1	0 - 30	U/L	XX	1 U/L
		serum	0 - 30 (30°C)	Units/L	0.01667	0 - 0.50	µkat/L	X.XX	0.01 µkat/L
Globulins, as immunoglobulins									
IgG	N	serum	500 - 1200	mg/dL	0.01	5.00 - 12.00	g/L	XX.XX	0.01 g/L
IgA	N	serum	50 - 350	mg/dL	0.01	0.50 - 3.50	g/L	XX.XX	0.01 g/L
IgM	N	serum	30 - 230	mg/dL	0.01	0.30 - 2.30	g/L	XX.XX	0.01 g/L
IgD		serum	<6	mg/dL	10	<60	mg/L	XXO	10 mg/L
IgE									
0 - 3 years		serum	0.5 - 10	IU/mL	2.40	1 - 24	µg/L	XX	1 µg/L
> 3 years		serum	5 - 100	IU/mL	2.40	12 - 240	µg/L	XX	1 µg/L
Glucagon		plasma, serum	50 - 100	pg/mL	1	50 - 100	ng/L	XXO	10 ng/L
Glucose (fasting)	N	plasma, serum	70 - 110	mg/dL	0.05551	3.9 - 6.1	mmol/L	XX.X	0.1 mmol/L
Glucose		CSF	50 - 80	mg/dL	0.05551	2.8 - 4.4	mmol/L	XX.X	0.1 mmol/L
Glutamic acid, amino acid fractionation		plasma, serum	0.2 - 2.8	mg/dL	67.97	15 - 190	µmol/L	XXX	5 µmol/L
Glutamine, amino acid fractionation		plasma, serum	6.1 - 10.2	mg/dL	68.42	420 - 700	µmol/L	XXX	5 µmol/L
Glutethimide									
Therapeutic		plasma, serum	<10	mg/L	4.603	<46	µmol/L	XX	1 µmol/L
Toxic		plasma, serum	>20	mg/L	4.603	>92	µmol/L	XX	1 µmol/L
Glycerol (free)		serum	<1.5	mg/dL	0.1086	<0.16	mmol/L	X.XX	0.01 mmol/L
Glycine, amino acid fractionation		plasma, serum	0.9 - 4.2	mg/dL	133.20	120 - 560	µmol/L	XXX	5 µmol/L
Gold, therapeutic		serum	300 - 800	µg/dL	0.05077	15.0 - 40.0	µmol/L	XX.X	0.1 µmol/L
Gold		urine	<500	µg/24 hr	0.005077	<2.5	µmol/d	X.X	0.1 µmol/d
Growth hormone									
Male (fasting)		plasma, serum	0 - 5	ng/mL	1	0 - 5	µg/L	XX.X	0.5 µg/L
Female (fasting)		plasma, serum	0 - 10	ng/mL	1	0 - 10	µg/L	XX.X	0.5 µg/L
Haptoglobin		serum	50 - 220	mg/dL	0.01	0.50 - 2.20	g/L	XX.XX	0.01 g/L
HCG (human chorionic gonadotropin)		serum	< 10 if not pregnant	mIU/mL	1	< 10 if not pregnant	IU/L	XX	1 IU/L
HCG (human chorionic gonadotropin)		urine	negative	neg/pos	1	negative	neg/pos	no digits	
HDL (high density lipoproteins)	N								
Male		plasma, serum	30 - 70	mg/dL	0.02586	0.80 - 1.80	mmol/L	X.XX	0.05 mmol/L
Female		plasma, serum	30 - 90	mg/dL	0.02586	0.80 - 2.35	mmol/L	X.XX	0.05 mmol/L
Hematocrit	N								
Female		whole blood	33 - 43	%	0.01	0.33 - 0.43	fraction of 1.00	0.XX	0.01
Male		whole blood	39 - 49	%	0.01	0.39 - 0.49	fraction of 1.00	0.XX	0.01

CONSTITUENT	FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR ---> MULT DIV <---	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
Hemoglobin								
Mass Concentration								
Female	N							
Male	whole blood	14.0 - 18.0	g/dL	10.0	140 - 180	g/L	XXX	1 g/L
Substance Concentration Hb [Fe]	whole blood	11.5 - 15.5	g/dL	10.0	115 - 155	g/L	XXX	1 g/L
Female	whole blood	12.0 -15.0	g/dL	0.6206	7.45 - 9.30	mmol/L	XX.XX	0.05 mmol/L
Male	whole blood	13.6 - 17.2	g/dL	0.6206	8.45 - 10.65	mmol/L	XX.XX	0.05 mmol/L
Hemoglobin, methemoglobin and sulfhemoglobin	whole blood	0	absent/present	1.0	0	absent/present	no digits	
Hemoglobin A1C	whole blood	3.8 - 8.4	%	0.01	0.038 - 0.064	fraction of 1.00	O.XXX	0.001
Hemoglobin A2	whole blood	2.0-3.0	%	0.01	0.02-0.03	fraction of 1.00	O.XX	0.01
Hemoglobin F (fetal hemoglobin)	whole blood	<2	%	0.01	< 0.02	fraction of 1.00	O.XX	0.01
Hemolytic Complement, Total (CH50)	serum	150-250	units/mL	1	150-250	arb unit	XXX	1 unit
Hgb-oxyhemoglobin, substance fraction	art whole blood	96-100	%	0.01	0.96-1.00	fraction of 1.00	O.XX	0.01
Oxygen saturation								
Hepatitis Tests								
Antibodies								
Antibody to delta Hepatitis Virus	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Antibody to Hepatitis A Virus	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Antibody to Hepatitis B Core Antigen	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Antibody to Hepatitis B Surface Antigen	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Antibody to Hepatitis C Virus	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Hepatitis Be Antibody	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Antigens								
Hepatitis B Surface Antigen	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
Hepatitis Be Antigen	serum	negative	highest pos. dil.	1	negative	highest pos. dil.	1:XX	
5-HIAA (5-Hydroxyindoleacetate, 5-hydroxy-indoleacetic acid)	urine	2 - 8	mg/24 hr	5.230	10 - 40	µmol/d	XXX	5 µmol/d
High Density Lipoproteins (HDL)	N							
Male	plasma, serum	30 - 70	mg/dL	0.02586	0.80 - 1.80	mmol/L	X.XX	0.05 mmol/L
Female	plasma, serum	30 - 90	mg/dL	0.02586	0.80 - 2.35	mmol/L	X.XX	0.05 mmol/L
Histidine, amino acid fractionation	plasma, serum	0.5 - 1.7	mg/dL	64.45	30 - 110	µmol/L	XXX	5 µmol/L
Homogentisate (homogentisic acid)	urine	0	mg/24 hr	5.947	0	µmol/d	XX	5 µmol/d
Homovanillate (homovanillic acid)	urine	<8	mg/24 hr	5.489	<45	µmol/d	XX	5 µmol/d
HPL (human placental lactogen)	plasma, serum	> 4, after 30 wk gestation	µg/mL	46.3	>180	nmol/L	XXX	5 nmol/L
	plasma, serum	> 4, after 30 wk gestation	mg/L	46.3	>180	nmol/L	XXX	5 nmol/L
Human chorionic gonadotropin (HCG)	serum	< 10 if not pregnant	mIU/mL	1	< 10 if not pregnant	IU/L	XX	1 IU/L
Human chorionic gonadotropin (HCG)	urine	negative	neg/pos	1	negative	neg/pos	no digits	
beta-Hydroxybutyrate (beta-hydroxybutyric acid)	serum	<1.0	mg/dL	96.05	<100	µmol/L	XXO	10 µmol/L

CONSTITUENT	FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR → MULT DIV ←	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
Hydroxycorticosteroids (as cortisol)								
Female	urine	2.0 - 8.0	mg/24 hr	2.759	5 - 25	µmol/d	XX	5 µmol/d
Male	urine	3.0 - 10.0	mg/24 hr	2.759	10 - 30	µmol/d	XX	5 µmol/d
5-Hydroxyindoleacetate (5-hydroxy-indoleacetic acid; 5-HIAA)	urine	2 - 8	mg/24 hr	5.230	10 - 40	µmol/d	XXX	5 µmol/d
4-Hydroxy-3-methoxymandelic acid (vanillylmandelic acid, VMA)	urine	<6.8	mg/24 hr	5.046	<35	µmol/d	XX	1 µmol/d
17-alpha-Hydroxyprogesterone								
Children	plasma, serum	0.2 - 1.4	µg/L	3.026	0.5 - 4.5	nmol/L	XX.X	0.5 nmol/L
Male	plasma, serum	0.5 - 2.5	µg/L	3.026	1.5 - 7.5	nmol/L	XX.X	0.5 nmol/L
Female	plasma, serum	0.3 - 4.2	µg/L	3.026	1.0 - 13.0	nmol/L	XX.X	0.5 nmol/L
Female, postmenopausal	plasma, serum	0.3 - 1.7	µg/L	3.026	1.0 - 5.0	nmol/L	XX.X	0.5 nmol/L
Hydroxyproline								
1 week - 1 yr	urine	55 - 220	mg/24 hr/m^2	7.626	420 - 1680	µmol/(d•m^2)	XXO	10 µmol/(d•m^2)
1 - 13 yr	urine	25 - 80	mg/24 hr/m^2	7.626	190 - 610	µmol/(d•m^2)	XXO	10 µmol/(d•m^2)
22 - 65 yr	urine	6 - 22	mg/24 hr/m^2	7.626	40 - 170	µmol/(d•m^2)	XXO	10 µmol/(d•m^2)
>65 yr	urine	5 - 17	mg/24 hr/m^2	7.626	40 - 130	µmol/(d•m^2)	XXO	10 µmol/(d•m^2)
Hydroxyproline, amino acid fractionation	plasma, serum	0 - trace	mg/dL	76.26	0 - trace	µmol/L	XXX	5 µmol/L
5-hydroxytryptamine (serotonin)	plasma	8 - 21	µg/dL	0.05675	0.45 - 1.20	µmol/L	X.XX	0.05 µmol/L
Imipramine, therapeutic	plasma, serum	50 - 200	ng/mL	3.566	180 - 710	nmol/L	XXO	10 nmol/L
Immunoglobulins								
IgG N	serum	500 - 1200	mg/dL	0.01	5.00 - 12.00	g/L	XX.XX	0.01 g/L
IgA N	serum	50 - 350	mg/dL	0.01	0.50 - 3.50	g/L	XX.XX	0.01 g/L
IgM N	serum	30 - 230	mg/dL	0.01	0.30 - 2.30	g/L	XX.XX	0.01 g/L
IgD	serum	<6	mg/dL	10	<60	mg/L	XXO	10 mg/L
IgE								
0 - 3 years	serum	0.5 - 10	IU/mL	2.40	1 - 24	µg/L	XX	1 µg/L
> 3 years	serum	5 - 100	IU/mL	2.40	12 - 240	µg/L	XX	1 µg/L
Inderal (propranolol hydrochloride), therapeutic	serum	50 - 200	ng/mL	3.856	190 - 770	nmol/L	XXO	10 nmol/L
Insulin								
	plasma, serum	5 - 20	µU/mL	7.175	35 - 145	pmol/L	XXX	5 pmol/L
	plasma, serum	5 - 20	mU/L	7.175	35 - 145	pmol/L	XXX	5 pmol/L
	plasma, serum	0.20 - 0.84	µg/L	172.2	35 - 145	pmol/L	XXX	5 pmol/L
Ionized Calcium N								
All populations	wh bld, plsm, ser	2.00 - 2.30	mEq/L	0.500	1.00 - 1.15	mmol/L	X.XX	0.01 mmol/L
All populations	wh bld, plsm, ser	4.00 - 4.60	mg/dL	0.250	1.00 - 1.15	mmol/L	X.XX	0.01 mmol/L
Iron N								
Male	serum	80 - 180	µg/dL	0.1791	14 - 32	µmol/L	XX	1 µmol/L
Female	serum	60 - 160	µg/dL	0.1791	11 - 29	µmol/L	XX	1 µmol/L
Iron-binding capacity N	serum	250 - 460	µg/dL	0.1791	45 - 82	µmol/L	XX	1 µmol/L
Isoleucine, amino acid fractionation	plasma, serum	0.5 - 1.3	mg/dL	76.24	40 - 100	µmol/L	XXX	5 µmol/L

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Isoniazid								
Therapeutic	serum	<2.0	mg/L	7.291	<15	µmol/L	XX	1 µmol/L
Toxic	serum	>3.0	mg/L	7.291	>22	µmol/L	XX	1 µmol/L
Isopropanol	plasma, serum	0	mg/dL	0.1664	0	mmol/L	XX	1 mmol/L
17-Ketogenic steroids (as dehydroepiandrosterone)								
Female	urine	7.0 - 12.0	mg/24 hr	3.467	25 - 40	µmol/d	XX	5 µmol/d
Male	urine	9.0 - 17.0	mg/24 hr	3.467	30 - 60	µmol/d	XX	5 µmol/d
17-Ketosteroids (as dehydroepiandrosterone)								
Female	urine	6.0 - 17.0	mg/24 hr	3.467	20 - 60	µmol/d	XX	5 µmol/d
Male	urine	6.0 - 20.0	mg/24 hr	3.467	20 - 70	µmol/d	XX	5 µmol/d
Ketosteroid fractions								
Androsterone								
Female	urine	0.5 - 3.0	mg/24 hr	3.443	1 - 10	µmol/d	XX	1 µmol/d
Male	urine	2.0 - 5.0	mg/24 hr	3.443	7 - 17	µmol/d	XX	1 µmol/d
Dehydroepiandrosterone								
Female	urine	0.2 - 1.8	mg/24 hr	3.467	1 - 6	µmol/d	XX	1 µmol/d
Male	urine	0.2 - 2.0	mg/24 hr	3.467	1 - 7	µmol/d	XX	1 µmol/d
Etiocholanolone								
Female	urine	0.8 - 4.0	mg/24 hr	3.443	2 - 14	µmol/d	XX	1 µmol/d
Male	urine	1.4 - 5.0	mg/24 hr	3.443	4 - 17	µmol/d	XX	1 µmol/d
Lactate (lactic acid)	plasma	0.5 - 2.0	mEq/L	1	0.5 - 2.0	mmol/L	X.X	0.1 mmol/L
	plasma	5 - 20	mg/dL	0.1110	0.5 - 2.0	mmol/L	X.X	0.1 mmol/L
Lactate dehydrogenase	serum	50 -150 (37°C)	Units/L	1	50 - 150	U/L	XXX	1 U/L
	serum	50 -150 (37°C)	Units/L	0.01667	0.82 - 2.66	µkat/L	X.XX	0.02 µkat/L
Lactate dehydrogenase isoenzymes								
LD1	serum	15 - 40	%	0.01	0.15 - 0.40	fraction of 1.00	0.XX	0.01
LD2	serum	20- 45	%	0.01	0.20 - 0.45	fraction of 1.00	0.XX	0.01
LD3	serum	15 - 30	%	0.01	0.15 - 0.30	fraction of 1.00	0.XX	0.01
LD4	serum	5 - 20	%	0.01	0.05 - 0.20	fraction of 1.00	0.XX	0.01
LD5	serum	5 - 20	%	0.01	0.05 - 0.20	fraction of 1.00	0.XX	0.01
LD1	serum	10 - 60	Units/L	0.01667	0.16 - 1.00	µkat/L	X.XX	0.02 µkat/L
	serum	10 - 60	Units/L	1	10 - 60	U/L	XX	1 U/L
LD2	serum	20 - 70	Units/L	0.01667	0.32 - 1.16	µkat/L	X.XX	0.02 µkat/L
	serum	20 - 70	Units/L	1	20 - 70	U/L	XX	1 U/L
LD3	serum	10 - 45	Units/L	0.01667	0.17 - 0.76	µkat/L	X.XX	0.02 µkat/L
	serum	10 - 45	Units/L	1	10 - 45	U/L	XX	1 U/L
LD4	serum	5 - 30	Units/L	0.01667	0.08 - 0.50	µkat/L	X.XX	0.02 µkat/L
	serum	5 - 30	Units/L	1	5 - 30	U/L	XX	1 U/L
LD5	serum	5 - 30	Units/L	0.01667	0.08 - 0.50	µkat/L	X.XX	0.02 µkat/L
	serum	5 - 30	Units/L	1	5 - 30	U/L	XX	1 U/L

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Magnesium (Mg)	N plasma, serum	1.8 - 3.0	mg/dL	0.4114	0.80 - 1.20	mmol/L	X.XX	0.02 mmol/L
	plasma, serum	1.6 - 2.4	mEq/L	0.500	0.80 - 1.20	mmol/L	X.XX	0.02 mmol/L
Maprotiline, therapeutic	plasma	50 - 200	ng/mL	3.605	180 - 720	nmol/L	XXO	10 nmol/L
MCH (Mean Corpuscular Hemoglobin)								
Mass	whole blood	27 - 33	pg	1	27 - 33	pg	XX	1 pg
Amount of substance Hb [Fe]	whole blood	27 - 33	pg	0.06206	1.70 - 2.05	fmol	X.XX	0.05 fmol
MCHC (Mean Corpuscular Hemoglobin Conc.)								
Mass Concentration	whole blood	33 - 37	g/dL	10	330 - 370	g/L	XXO	10 g/L
	whole blood	33 - 37	%	0.01	0.33 - 0.37	fraction of 1.00	O.XX	0.01
Amount of substance Hb[Fe]	whole blood	33 - 37	g/dL	0.6206	20 - 23	mmol/L	XXX	1 mmol/L
MCV (Mean Corpuscular Volume)	whole blood	76 - 100	µm^3	1	76 - 100	fL	XXX	1 fL
Mean Corpuscular Hemoglobin (MCH)								
Mass	whole blood	27 - 33	pg	1	27 - 33	pg	XX	1 pg
Amount of substance Hb [Fe]	whole blood	27 - 33	pg	0.06206	1.70 - 2.05	fmol	X.XX	0.05 fmol
Mean Corpuscular Hemoglobin Conc.(MCHC)								
Mass Concentration	whole blood	33 - 37	g/dL	10	330 - 370	g/L	XXO	10 g/L
	whole blood	33 - 37	%	0.01	0.33 - 0.37	fraction of 1.00	O.XX	0.01
Amount of substance Hb[Fe]	whole blood	33 - 37	g/dL	0.6206	20 - 23	mmol/L	XXX	1 mmol/L
Mean Corpuscular Volume (MCV)	whole blood	76 - 100	µm^3	1	76 - 100	fL	XXX	1 fL
Meprobamate								
Therapeutic	plasma, serum	<20	mg/L	4.582	<90	µmol/L	XXO	10 µmol/L
Toxic	plasma, serum	>40	mg/L	4.582	>180	µmol/L	XXO	10 µmol/L
Mercury								
Normal	whole blood	<1.0	µg/dL	49.85	<50	nmol/L	XXO	10 nmol/L
Chronic	whole blood	>20	µg/dL	0.04985	>1.00	µmol/L	X.XX	0.01 µmol/L
Mercury								
Normal	urine	<30	µg/24 hr	4.985	<150	nmol/d	XXO	10 nmol/d
Exposure								
Organic	urine	>45	µg/24 hr	4.985	>220	nmol/d	XXO	10 nmol/d
Inorganic	urine	>450	µg/24 hr	0.004985	>2.20	µmol/d	X.XX	0.01 µmol/d
Metanephrines (as normetanephrine)	urine	0 - 2.0	mg/24 hr	5.458	0 - 11.0	µmol/d	XX.X	0.5 µmol/d
Methanol	plasma, serum	0	mg/dL	0.3121	0	mmol/L	XX	1 mmol/L
Methaqualone								
Therapeutic	plasma, serum	<10	mg/L	3.995	<40	µmol/L	XXO	10 µmol/L
Toxic	plasma, serum	>30	mg/L	3.995	>120	µmol/L	XXO	10 µmol/L
Methionine, amino acid fractionation	plasma, serum	0.1 - 0.6	mg/dL	67.02	5 - 40	µmol/L	XXX	5 µmol/L
Methotrexate, toxic	plasma, serum	>2.3	mg/L	2.20	>5.0	µmol/L	X.X	0.1 µmol/L
Methsuximide (as desmethylsuximide), therapeutic	plasma, serum	10 - 40	mg/L	5.285	50 - 210	µmol/L	XXO	10 µmol/L
Methyprylon								
Therapeutic	plasma	<10	mg/L	5.457	<50	µmol/L	XXO	10 µmol/L
Toxic	plasma	>40	mg/L	5.457	>220	µmol/L	XXO	10 µmol/L

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beta-2-Microglobulin, <50 yrs	serum	0.80 - 2.40	mg/L	84.750	68 - 204	nmol/L	XXX	2 nmol/L
beta-2-Microglobulin, <50 yrs	urine	<140	µg/24 hr	0.08475	<12	nmol/d	XXX	2 nmol/d
Muramidase (lysozyme)	serum	1 - 15	µg/mL	1	1 - 15	mg/L	XXX	1 mg/L
Muramidase (lysozyme)	urine	<2	µg/mL	1	<2	mg/L	XX	1 mg/L
N-acetylprocainamide, therapeutic N	plasma, serum	4.0 - 8.0	mg/L	3.606	14 - 29	µmol/L	XX	1 µmol/L
Nitrogen, amino acid	plasma	4.0 - 6.0	mg/dL	0.7139	2.9 - 4.3	mmol/L	X.X	0.1 mmol/L
Nitrogen, amino acid	urine	50 - 200	mg/24 hr	0.07139	3.6 - 14.3	mmol/d	X.X	0.1 mmol/d
Nitrogen, total	urine	diet dependent	g/24 hr	71.36	diet dependent	mmol/d	XXO	10 mmol/d
Nitroprusside toxicity (thiocyanate)	plasma	> 10.0	mg/dL	0.1722	> 1.75	mmol/L	X.X	0.05 mmol/L
Norepinephrine	plasma	215 - 475 (at rest for 15 min)	pg/mL	0.005911	1.27 - 2.81 (at rest for 15 min)	nmol/L	X.XX	0.01 nmol/L
Norepinephrine	urine	<100	µg/24 hr	5.911	<590	nmol/d	XXO	10 nmol/d
Nortriptyline, therapeutic	plasma, serum	25 - 200	ng/mL	3.797	90 - 760	nmol/L	XXO	10 nmol/L
5'Nucleotidase	plasma, serum	2 - 17 (37°C)	U/L	1	2 - 17	U/L	XX	1 U/L
	plasma, serum	2 - 17 (37°C)	U/L	0.01667	0.03 - 0.28	µkat/L	X.XX	0.01 µkat/L
Ornithine, amino acid fractionation	plasma, serum	0.4 - 1.4	mg/dL	75.67	30 - 400	µmol/L	XXX	5 µmol/L
Osmolality	plasma, serum	280 - 300	mOsm/kg	1	280 - 300	mmol/kg	XXX	1 mmol/kg
	urine	50 - 1200	mOsm/kg	1	50 - 1200	mmol/kg	XXX	1 mmol/kg
Oxalate (as anhydrous oxalic acid)	urine	10 - 40	mg/24 hr	11.11	110 - 440	µmol/d	XXO	10 µmol/d
Oxygen saturation (Hgb-oxyhemoglobin, substance fraction)	art whole blood	96-100	%	0.01	0.96-1.00	fraction of 1.00	O.XX	0.01
Palmitic acid	amniotic fluid	gestation dependent	mmol/L	1000	gestation dependent	µmol/L	XXX	5 µmol/L
Partial Thromboplastin Time (PTT) - activated	plasma	22-37	seconds	1	22-37	seconds	XX	1 sec
pCO2 N	art whole blood	35 - 45	mm Hg	0.1333	4.7 - 6.0	kPa	X.X	0.1 kPa
Pentobarbital, therapeutic	plasma, serum	20 - 40	mg/L	4.419	90 - 170	µmol/L	XXX	5 µmol/L
pH	art whole blood	7.35 - 7.45	pH units	1	7.35 - 7.45	pH units	X.XX	0.01
Phenobarbital, therapeutic N	plasma, serum	2 - 5	mg/dL	43.06	85 - 215	µmol/L	XXX	5 µmol/L
Phensuximide	plasma, serum	4 - 8	mg/L	5.285	20 - 40	µmol/L	XX	5 µmol/L
Phenylalanine, amino acid fractionation	plasma, serum	0.6 - 1.5	mg/dL	60.54	35 - 90	µmol/L	XXX	5 µmol/L
Phenylbutazone, therapeutic	plasma	<100	mg/L	3.243	<320	µmol/L	XXO	10 µmol/L
Phenytoin (Dilantin, Diphenylhydantoin) N								
Therapeutic	plasma, serum	10 - 20	mg/L	3.964	40 - 80	µmol/L	XX	5 µmol/L
Toxic	plasma, serum	>30	mg/L	3.964	>120	µmol/L	XX	5 µmol/L
Phosphatase, acid (prostatic)	serum	0 - 0.8 (37°C)	Units/L	1	0 - 0.8	U/L	X.X	0.1 U/L
	serum	0 - 0.8 (37°C)	Units/L	16.67	0 - 13.3	nkat/L	XX.X	0.1 nkat/L
Phosphatase, alkaline	serum	30 - 120 (37°C)	Units/L	1	30 - 120	U/L	XXX	1 U/L
	serum	30 - 120 (37°C)	Units/L	0.01667	0.5 - 2.0	µkat/L	X.X	0.1 µkat/L
Phosphate (as phosphorus, inorganic) N	serum	2.5 - 5.0	mg/dL	0.3229	0.80 - 1.60	mmol/L	X.XX	0.05 mmol/L
Phosphate (as phosphorus, inorganic)	urine	diet dependent	g/24 hr	32.29	diet dependent	mmol/d	XXX	1 mmol/d
Phospholipid phosphorus, total	plasma, serum	5 - 12	mg/dL	0.3229	1.60 - 3.90	mmol/L	X.XX	0.05 mmol/L
Phospholipid phosphorus, total	RBC	1.2 - 12.0	mg/dL	0.3229	0.40 - 3.90	mmol/L	X.XX	0.05 mmol/L

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Phospholipids, substance fraction of total phospholipid								
Phosphatidylcholine	plasma, serum	65 - 70	%	0.01	0.65 - 0.70	fraction of 1.00	O.XX	0.01
Phosphatidylethanolamine	plasma, serum	4 - 5	%	0.01	0.04 - 0.05	fraction of 1.00	O.XX	0.01
Sphingomyelin	plasma, serum	15 - 20	%	0.01	0.15 - 0.20	fraction of 1.00	O.XX	0.01
Lysophosphatidylcholine	plasma, serum	3 - 5	%	0.01	0.03 - 0.05	fraction of 1.00	O.XX	0.01
Phospholipids, substance fraction of total phospholipid								
Phosphatidylcholine	RBC	28 - 33	%	0.01	0.28 - 0.33	fraction of 1.00	O.XX	0.01
Phosphatidylethanolamine	RBC	24 - 31	%	0.01	0.24 - 0.31	fraction of 1.00	O.XX	0.01
Sphingomyelin	RBC	22 - 39	%	0.01	0.22 - 0.29	fraction of 1.00	O.XX	0.01
Phosphatidylserine and Phosphatidylinositol	RBC	12 - 20	%	0.01	0.12 - 0.20	fraction of 1.00	O.XX	0.01
Lysophosphatidylcholine	RBC	1 - 2	%	0.01	0.01 - 0.02	fraction of 1.00	O.XX	0.01
Phosphorus, inorganic (phosphate)	N serum	2.5 - 5.0	mg/dL	0.3229	0.80 - 1.60	mmol/L	X.XX	0.05 mmol/L
Phosphorus, inorganic (phosphate)	urine	diet dependent	g/24 hr	32.29	diet dependent	mmol/d	XXX	1 mmol/d
Phytanic acid	plasma	trace - 0.3	mg/dL	32.00	<10	µmol/L	XX	5 µmol/L
Placental lactogen, human (HPL)	plasma, serum	> 4, after 30 wk gestation	µg/mL	46.3	>180	nmol/L	XXX	5 nmol/L
	plasma, serum	> 4, after 30 wk gestation	mg/L	46.3	>180	nmol/L	XXX	5 nmol/L
Plasminogen	plasma	90 - 136	%	0.01	0.90 - 1.36	fraction of 1.00	O.XX	0.01
Platelet count	whole blood	130 - 400	10^3/mm^3	1	130 - 400	10^9/L	XXX	5 * 10^9/L
pO2	N art whole blood	75 - 100	mm Hg	0.1333	10.0 - 13.3	kPa	XX.X	0.1 kPa
Porphobilinogen	urine	0.0 - 2.0	mg/24 hr	4.420	0 - 9.0	µmol/d	XX.X	0.1 µmol/d
Porphyrins								
Coproporphyrin	urine	45 - 180	µg/24 hr	1.527	68 - 276	nmol/d	XXX	2 nmol/d
Protoporphyrin	RBC	15 - 50	µg/dL	0.0177	0.28 - 0.90	µmol/L	X.XX	0.02 µmol/L
Uroporphyrin	urine	5 - 20	µg/24 hr	1.204	6 - 24	nmol/d	XX	2 nmol/d
Potassium	plasma, serum	3.5-5.0	mEq/L	1	3.5-5.0	mmol/L	X.X	0.1 mmol/L
	plasma, serum	13.7 - 19.5	mg/dL	0.2558	3.5-5.0	mmol/L	X.X	0.1 mmol/L
Potassium (diet dependent)	urine	25 - 100	mEq/24 hr	1	25 - 100	mmol/d	XX	1 mmol/d
Pregnanediol								
Normal	urine	1.0 - 6.0	mg/24 hr	3.120	3.0 - 16.5	µmol/d	XX.X	0.5 µmol/d
Pregnancy	urine	gestation dependent	mg/24 hr	3.120	gestation dependent	µmol/d	XX.X	0.5 µmol/d
Pregnanetriol	urine	0.5 - 2.0	mg/24 hr	2.972	1.5 - 6.0	µmol/d	XX.X	0.5 µmol/d
Primidone								
Therapeutic	plasma, serum	6.0 - 10.0	mg/L	4.582	25 - 46	µmol/L	XX	1 µmol/L
Toxic	plasma, serum	>10.0	mg/L	4.582	>46	µmol/L	XX	1 µmol/L
Procainamide	N							
Therapeutic	plasma, serum	4.0 - 8.0	mg/L	4.249	17 - 34	µmol/L	XX	1 µmol/L
Toxic	plasma, serum	>12	mg/L	4.249	>50	µmol/L	XX	1 µmol/L
N-acetylprocainamide, therapeutic	N plasma, serum	4.0 - 8.0	mg/L	3.606	14 - 29	µmol/L	XX	1 µmol/L

CONSTITUENT	FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR → MULT ← DIV	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
Progesterone	N							
Follicular phase	plasma, serum	<2	ng/mL	3.180	<6	nmol/L	XX	2 nmol/L
Luteal phase	plasma, serum	2 - 20	ng/mL	3.180	6 - 64	nmol/L	XX	2 nmol/L
Progesterone Receptors								
Negative Result	tissue	0 - 3	fmol of progesterone bound/mg of cytosol protein	1	0 - 3	fmol of progesterone bound/mg of cytosol protein	XX	1 fmol/mg of protein
Doubtful Result	tissue	4 - 10	fmol of progesterone bound/mg of cytosol protein	1	4 - 10	fmol of progesterone bound/mg of cytosol protein	XX	1 fmol/mg of protein
Positive Result	tissue	>10	fmol of progesterone bound/mg of cytosol protein	1	>10	fmol of progesterone bound/mg of cytosol protein	XX	1 fmol/mg of protein
Prolactin	plasma, serum	<20	ng/mL	1	<20	µg/L	XX	1 µg/L
Proline, amino acid fractionation	plasma, serum	1.2 - 3.9	mg/dL	86.86	105 - 340	µmol/L	XXX	5 µmol/L
Propoxyphene, toxic	plasma, serum	>2.0	mg/L	2.946	>5.9	µmol/L	X.X	0.1 µmol/L
Propranolol hydrochloride (Inderal), therapeutic	serum	50 - 200	ng/mL	3.856	190 - 770	nmol/L	XXO	10 nmol/L
Protein, electrophoresis								
Albumin	serum	60 - 65	%	0.01	0.60 - 0.65	fraction of 1.00	O.XX	0.01
Alpha 1 Globulin	serum	1.7 - 5.0	%	0.01	0.02 - 0.05	fraction of 1.00	O.XX	0.01
Alpha 2 Globulin	serum	6.7 - 12.5	%	0.01	0.07 - 0.13	fraction of 1.00	O.XX	0.01
Beta Globulin	serum	8.3 - 16.3	%	0.01	0.08 - 0.16	fraction of 1.00	O.XX	0.01
Gamma Globulin	serum	10.7 - 20.0	%	0.01	0.11 - 0.20	fraction of 1.00	O.XX	0.01
Albumin	serum	3.6 - 5.2	g/dL	10	36 - 52	g/L	XX	1 g/L
Alpha 1 Globulin	serum	0.1 - 0.4	g/dL	10	1 - 4	g/L	XX	1 g/L
Alpha 2 Globulin	serum	0.4 - 1.0	g/dL	10	4 - 10	g/L	XX	1 g/L
Beta Globulin	serum	0.5 - 1.2	g/dL	10	5 - 12	g/L	XX	1 g/L
Gamma Globulin	serum	0.6 - 1.6	g/dL	10	6 - 16	g/L	XX	1 g/L
Protein, electrophoresis	urine	no monoclonal paraproteins	neg/pos	1	no monoclonal paraproteins	neg/pos	no digits	
Protein, total	N plasma, serum	6.0 - 8.0	g/dL	10	60-80	g/L	XX	1 g/L
Protein	CSF	<40	mg/dL	0.01	<0.40	g/L	X.XX	0.01 g/L
Protein (quantitative)	urine	<150	mg/24 hr	0.001	<0.15	g/d	X.XX	0.01 g/d
Prothrombin (coagulation factor II)	plasma	70-130	%	0.01	0.70-1.30	fraction of 1.00	X.XX	0.01
Prothrombin Time (as PT)	plasma	9 - 12	seconds	1	9 - 12	seconds	XX	1 sec
Protoporphyrin	RBC	15 - 50	µg/dL	0.0177	0.28 - 0.90	µmol/L	X.XX	0.02 µmol/L
Protriptyline	plasma, serum	100 - 300	ng/mL	3.797	380 - 1140	nmol/L	XXO	10 nmol/L
Pteroylglutamic acid (folate, folic acid)	serum	2 - 10	ng/mL	2.266	4 - 22	nmol/L	XX	2 nmol/L
	serum	2 - 10	µg/dL	22.66	4 - 22	nmol/L	XX	2 nmol/L
PT (Prothrombin Time)	plasma	9 - 12	seconds	1	9 - 12	seconds	XX	1 sec
PTT (Partial Thromboplastin Time) - activated	plasma	22-37	seconds	1	22-37	seconds	XX	1 sec

CONSTITUENT	FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR → MULT DIV ←	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
Pyridoxal (vitamin B6)	plasma	20 - 90	ng/mL	5.982	120-540	nmol/L	XXX	5 nmol/L
Pyruvate (pyruvic acid)	plasma	0.30 - 0.90	mg/dL	113.6	35 - 100	µmol/L	XXX	5 µmol/L
Quinidine								
Therapeutic	plasma, serum	1.5 - 3.0	mg/L	3.082	4.6 - 9.2	µmol/L	XX.X	0.1 µmol/L
Toxic	plasma, serum	>6.0	mg/L	3.082	>18.5	µmol/L	XX.X	0.1 µmol/L
RBC Count (erythrocyte count)								
Female	whole blood	3.5 - 5.0	10^6/mm^3	1	3.5 - 5.0	10^12/L	X.X	0.1 • 10^12/L
Male	whole blood	4.3 - 5.9	10^6/mm^3	1	4.3 - 5.9	10^12/L	X.X	0.1 • 10^12/L
RBC Count (erythrocyte count)	CSF	0	per mm^3	1	0	10^6/L	XX	1 • 10^6/L
RCoF (Coagulation Factor VIII VW, Ristocetin Cofactor, von Willebrand Factor)	plasma	50 - 150	%	0.01	0.50 - 1.50	fraction of 1.00	X.XX	0.01
Renin								
Normal sodium diet	plasma	1.1 - 4.1	ng/mL/hr	0.2778	0.30 - 1.14	ng/(L•s)	X.XX	0.02 ng/(L•s)
Restricted sodium diet	plasma	6.2 - 12.4	ng/mL/hr	0.2778	1.72 - 3.44	ng/(L•s)	X.XX	0.02 ng/(L•s)
Reticulocyte count - adults	whole blood	10 - 75	10^3/mm^3	0.001	10 - 75	10^9/L	XX	1 • 10^9/L
Number fraction	whole blood	1 - 24	number per 1,000 RBC	0.001	0.001 - 0.024	fraction of 1.00	O.XXX	0.001
Number fraction	whole blood	0.1 - 2.4	%	0.01	0.001 - 0.024	fraction of 1.00	O.XXX	0.001
Retinol (vitamin A)	plasma, serum	10 - 50	µg/dL	0.03491	0.35 - 1.75	µmol/L	X.XX	0.05 µmol/L
Rheumatoid Factor	serum	< 80	IU/mL	1	< 80	kIU/L	XX	1 IU/L
	serum	neg at < 1:80 dil	highest pos. dil.	1	neg at < 1:80 dil	highest pos. dil.	1:XX	
Rheumatoid Factor	synovial fluid	< 80	IU/mL	1	< 80	kIU/L	XX	1 IU/L
	synovial fluid	neg at < 1:80 dil	highest pos. dil.	1	neg at < 1:80 dil	highest pos. dil.	1:XX	
Riboflavin (vitamin B2)	serum	2.6 - 3.7	µg/dL	26.57	70-100	nmol/L	XXX	5 nmol/L
Ristocetin Cofactor (Coagulation Factor VIII VW, RCoF, von Willebrand Factor)	plasma	50 - 150	%	0.01	0.50 - 1.50	fraction of 1.00	X.XX	0.01
Salicylate, toxic	plasma, serum	>20	mg/dL	0.07240	>1.45	mmol/L	X.XX	0.05 mmol/L
Sedimentation Rate (RBC)								
Female	whole blood	0 - 30	mm/hr	1	0 - 30	mm/hr	XX	1 mm/hr
Male	whole blood	0 - 20	mm/hr	1	0 - 20	mm/hr	XX	1 mm/hr
Serine, amino acid fractionation	plasma, serum	0.5 - 1.8	mg/dL	95.16	75 - 170	µmol/L	XXX	5 µmol/L
Serotonin (5-hydroxytryptamine)	plasma	8 - 21	µg/dL	0.05675	0.45 - 1.20	µmol/L	X.XX	0.05 µmol/L
Serum Protein Electrophoresis								
Albumin	serum	60 - 65	%	0.01	0.60 - 0.65	fraction of 1.00	O.XX	0.01
Alpha 1 Globulin	serum	1.7 - 5.0	%	0.01	0.02 - 0.05	fraction of 1.00	O.XX	0.01
Alpha 2 Globulin	serum	6.7 - 12.5	%	0.01	0.07 - 0.13	fraction of 1.00	O.XX	0.01
Beta Globulin	serum	8.3 - 16.3	%	0.01	0.08 - 0.16	fraction of 1.00	O.XX	0.01
Gamma Globulin	serum	10.7 - 20.0	%	0.01	0.11 - 0.20	fraction of 1.00	O.XX	0.01
Albumin	serum	3.6 - 5.2	g/dL	10	36 - 52	g/L	XX	1 g/L
Alpha 1 Globulin	serum	0.1 - 0.4	g/dL	10	1 - 4	g/L	XX	1 g/L
Alpha 2 Globulin	serum	0.4 - 1.0	g/dL	10	4 - 10	g/L	XX	1 g/L

CONSTITUENT	FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR → MULT / DIV ←	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
Serum Protein Electrophoresis (continued)								
Beta Globulin	serum	0.5 - 1.2	g/dL	10	5 - 12	g/L	XX	1 g/L
Gamma Globulin	serum	0.6 - 1.6	g/dL	10	6 - 16	g/L	XX	1 g/L
Serum Viscosity	serum	1.4 - 2.0 times that of water		1	1.4 - 2.0 times that of water		X.X	0.1 relative units
SGOT (aspartate aminotransferase, AST)	serum	0 - 35 (37°C)	Units/L	1	0 - 35	U/L	XX	1 U/L
	serum	0 - 35 (37°C)	Units/L	0.01667	0 - 0.58	µkat/L	0.XX	0.01 µkat/L
SGPT (alanine aminotransferase, ALT)	serum	0 - 35 (37°C)	Units/L	1	0 - 35	U/L	XX	1 U/L
	serum	0 - 35 (37°C)	Units/L	0.01667	0 - 0.58	µkat/L	X.XX	0.01 µkat/L
Sodium	plasma, serum	135 - 147	mEq/L	1	135 - 147	mmol/L	XXX	1 mmol/L
Sodium	urine	diet dependent	mEq/24 hr	1	diet dependent	mmol/d	XXX	1 mmol/d
Stearic acid (as fecal fat)	feces	2.0 - 6.0	g/24 hr	3.515	7 - 21	mmol/d	XX	1 mmol/d
Steroids								
Hydroxycorticosteroids (as cortisol)								
Female	urine	2.0 - 8.0	mg/24 hr	2.759	5 - 25	µmol/d	XX	5 µmol/d
Male	urine	3.0 - 10.0	mg/24 hr	2.759	10 - 30	µmol/d	XX	5 µmol/d
17-Ketogenic steroids (as dehydroepiandrosterone)								
Female	urine	7.0 - 12.0	mg/24 hr	3.467	25 - 40	µmol/d	XX	5 µmol/d
Male	urine	9.0 - 17.0	mg/24 hr	3.467	30 - 60	µmol/d	XX	5 µmol/d
17-Ketosteroids (as dehydroepiandrosterone)								
Female	urine	6.0 - 17.0	mg/24 hr	3.467	20 - 60	µmol/d	XX	5 µmol/d
Male	urine	6.0 - 20.0	mg/24 hr	3.467	20 - 70	µmol/d	XX	5 µmol/d
Ketosteroid fractions								
Androsterone								
Female	urine	0.5 - 3.0	mg/24 hr	3.443	1 - 10	µmol/d	XX	1 µmol/d
Male	urine	2.0 - 5.0	mg/24 hr	3.443	7 - 17	µmol/d	XX	1 µmol/d
Dehydroepiandrosterone								
Female	urine	0.2 - 1.8	mg/24 hr	3.467	1 - 6	µmol/d	XX	1 µmol/d
Male	urine	0.2 - 2.0	mg/24 hr	3.467	1 - 7	µmol/d	XX	1 µmol/d
Etiocholanolone								
Female	urine	0.8 - 4.0	mg/24 hr	3.443	2 - 14	µmol/d	XX	1 µmol/d
Male	urine	1.4 - 5.0	mg/24 hr	3.443	4 - 17	µmol/d	XX	1 µmol/d
Androstenedione								
Male > 18 yrs	serum	0.2 - 3.0	µg/L	3.492	0.5 - 10.5	nmol/L	XX.X	0.5 nmol/L
Female >18 yrs	serum	0.6 - 3.0	µg/L	3.492	3.0 - 10.5	nmol/L	XX.X	0.5 nmol/L
Sulfonamides (as sulfanilamide), therapeutic	plasma	10.0 - 15.0	mg/dL	58.07	580 - 870	µmol/L	XXO	10 µmol/L
T3 uptake, thyroid test N	serum	25 - 35	%	0.01	0.25 - 0.35	fraction of 1.00	O.XX	0.01
T3 (triiodothyronine)	serum	75 - 220	ng/dL	0.01536	1.2 - 3.4	nmol/L	X.X	0.1 nmol/L
T4 (thyroxine) N	serum	4.0 - 11.0	µg/dL	12.87	51 - 142	nmol/L	XXX	1 nmol/L
Taurine, amino acid fractionation	plasma, serum	0.3 - 2.1	mg/dL	79.91	25 - 170	µmol/L	XXX	5 µmol/L

CONSTITUENT		FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR → MULT / DIV ←	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
TBG (thyroxine-binding globulin), thyroid test for thyroxine		serum	12.0 - 28.0	µg/dL	12.87	150 - 360	nmol/L	XXO	1 nmol/L
Testosterone	N								
Female		plasma, serum	<0.6	ng/mL	3.467	<2.0	nmol/L	XX.X	0.5 nmol/L
Male		plasma, serum	4.0 - 8.0	ng/mL	3.467	14.0 - 28.0	nmol/L	XX.X	0.5 nmol/L
Theophylline, therapeutic	N	plasma, serum	10.0 - 20.0	mg/L	5.550	55 - 110	µmol/L	XXX	1 µmol/L
Thiamine hydrochloride (vitamin B1)		urine	60 - 500	µg/24 hr	0.002965	0.18 - 1.48	µmol/d	X.XX	0.02 µmol/d
Thiocyanate (nitroprusside toxicity)		plasma	> 10.0	mg/dL	0.1722	> 1.75	mmol/L	X.XX	0.05 mmol/L
Thiopental, therapuetic		plasma, serum	individual	mg/L	4.126	individual	µmol/L	XXX	5 µmol/L
Threonine, amino acid fractionation		plasma, serum	0.9 - 2.5	mg/dL	83.95	75 - 210	µmol/L	XXX	5 µmol/L
Thrombin time		plasma	<17	seconds	1	<17	seconds	XX	1 sec
Thyroid tests									
Thyroid-stimulating hormone (TSH)		serum	2 - 11	µU/mL	1	2 - 11	mU/L	XX	1 mU/L
Thyroid Hormone Binding Index (THBI)		serum	0.83 - 1.17	unitless ratio	1	0.83 - 1.17	unitless ratio	0.XX	0.01
Thyroxine (T4)	N	serum	4.0 - 11.0	µg/dL	12.87	51 - 142	nmol/L	XXX	1 nmol/L
Thyroxine-binding globulin (TBG), for thyroxine		serum	12.0 - 28.0	µg/dL	12.87	150 - 360	nmol/L	XXO	10 nmol/L
Thyroxine, free		serum	0.8 - 2.8	ng/dL	12.87	10 - 36	pmol/L	XX	1 pmol/L
Triiodothyronine (T3)		serum	75 - 220	ng/dL	0.01536	1.2 - 3.4	nmol/L	X.X	0.1 nmol/L
T3 uptake	N	serum	25 - 35	%	0.01	0.25 - 0.35	fraction of 1.00	O.XX	0.01
Tobramycin, therapeutic (peak)		serum	4 - 8	µg/mL	2.1	8.4 - 16.8	µmol/L	X.X	0.1 µmol/L
alpha-Tocopherol (vitamin E)		plasma, serum	0.78 - 1.25	mg/dL	23.22	18 - 29	µmol/L	XX	1 µmol/L
Total Hemolytic Complement (CH50)		serum	150-250	units/mL	1	150-250	arb unit	XXX	1 unit
Total Lipids		plasma	400 - 850	mg/dL	0.01	4.0 - 8.5	g/L	X.X	0.1 g/L
Total Protein	N	plasma, serum	6.0-8.0	g/dL	10	60-80	g/L	XX	1 g/L
		CSF	<40	mg/dL	0.01	<0.40	g/L	X.XX	0.01 g/L
		urine	<150	mg/24 hr	0.001	<0.15	g/d	X.XX	0.01 g/d
Transferrin	N	serum	170 - 370	mg/dL	0.01	1.70 - 3.70	g/L	X.XX	0.01 g/L
Triglycerides (as triolein)	N	plasma, serum	<160	mg/dL	0.01129	<1.80	mmol/L	X.XX	0.02 mmol/L
Triiodothyronine (T3)		serum	75 - 220	ng/dL	0.01536	1.2 - 3.4	nmol/L	X.X	0.1 nmol/L
Trimethadione, therapeutic		plasma	<50	mg/L	6.986	<350	µmol/L	XXO	10 µmol/L
Trimipramine, therapeutic		plasma	50 - 200	ng/mL	3.397	170 - 680	nmol/L	XXO	10 nmol/L
Tryptophan, amino acid fractionation		plasma, serum	0.5 - 2.5	mg/dL	48.97	25 - 125	µmol/L	XXX	5 µmol/L
TSH (thyroid-stimulating hormone)		serum	2 - 11	µU/mL	1	2 - 11	mU/L	XX	1 mU/L
Tyrosine, amino acid fractionation		plasma, serum	0.4 - 1.6	mg/dL	55.19	20 - 90	µmol/L	XXX	5 µmol/L
Urate (as uric acic)	N	serum	2.0 - 7.0	mg/dL	59.48	120 - 420	µmol/L	XXO	10 µmol/L
Urate (as uric acic)		urine	diet dependent	g/24 hr	5.948	diet dependent	mmol/d	XX	1 mmol/d
Urea nitrogen (BUN)	N	plasma, serum	8 - 18	mg/dL	0.357	3.0 - 6.5	mmol/L of urea	X.X	0.5 mmol/L
Urea nitrogen (BUN)		urine	12 - 20 (diet dep)	g/24 hr	35.70	450 - 700	mmol/d of urea	XXO	10 mmol/d
Uric Acid (Urate)	N	serum	2.0 - 7.0	mg/dL	59.48	120 - 420	µmol/L	XXO	10 µmol/L
Uric Acid (Urate)		urine	diet dependent	g/24 hr	5.948	diet dependent	mmol/d	XX	1 mmol/d
Urine Protein Electrophoresis		urine	no monoclonal paraproteins	neg/pos	1	no monoclonal paraproteins	neg/pos	no digits	

CONSTITUENT	FLUID	TRADITIONAL APPROXIMATE NORMAL RANGE	TRADITIONAL UNITS	CONVERSION FACTOR ⟶ MULT DIV ⟵	SI APPROXIMATE NORMAL RANGE	SI UNITS	SIGNIFICANT DIGITS	SUGGESTED ANALYTICAL PRECISION
Urobilinogen	urine	0 - 4.0	mg/24 hr	1.693	0.0 - 6.8	µmol/d	X.X	0.1 µmol/d
Uroporphyrin	urine	5 - 20	µg/24 hr	1.204	6 - 24	nmol/d	XX	2 nmol/d
Valine, amino acid fractionation	plasma, serum	1.7 - 3.7	mg/dL	85.36	145 - 315	µmol/L	XXX	5 µmol/L
Valproic acid, therapeutic	plasma, serum	50 -100	mg/L	6.934	350 - 700	µmol/L	XXO	10 µmol/L
Vanillylmandelic acid (VMA, 4-hydroxy-3-methoxymandelic acid)	urine	<6.8	mg/24 hr	5.046	<35	µmol/d	XX	1 µmol/d
Viscosity	serum	1.4 - 2.0 times that of water		1	1.4 - 2.0 times that of water		X.X	0.1 relative units
Vitamin A (retinol)	plasma, serum	10 - 50	µg/dL	0.03491	0.35 - 1.75	µmol/L	X.XX	0.05 µmol/L
Vitamin B1 (thiamine hydrochloride)	urine	60 - 500	µg/24 hr	0.002965	0.18 - 1.48	µmol/d	X.XX	0.02 µmol/d
Vitamin B2 (riboflavin)	serum	2.6 - 3.7	µg/dL	26.57	70-100	nmol/L	XXX	5 nmol/L
Vitamin B6 (pyridoxal)	plasma	20 - 90	ng/mL	5.982	120-540	nmol/L	XXX	5 nmol/L
Vitamin B12 (cyanocobalamin)	serum	200 - 1000	pg/mL	0.7378	150 - 750	pmol/L	XXO	10 pmol/L
	serum	20 - 100	ng/dL	7.378	150 - 750	pmol/L	XXO	10 pmol/L
Vitamin C (ascorbate)	plasma, serum	0.6 - 2.0	mg/dL	56.78	30 - 110	µmol/L	XXO	10 µmol/L
Vitamin D3 (cholecalciferol)	serum	24 - 40	ng/mL	2.598	60 - 105	nmol/L	XXX	5 nmol/L
25-OH-cholecalciferol	serum	18 - 36	ng/mL	2.496	45 - 90	nmol/L	XXX	5 nmol/L
Vitamin E (alpha-tocopherol)	plasma, serum	0.78 - 1.25	mg/dL	23.22	18 - 29	µmol/L	XX	1 µmol/L
VMA (vanillylmandelic acid, 4-hydroxy-3-methoxymandelic acid)	urine	<6.8	mg/24 hr	5.046	<35	µmol/d	XX	1 µmol/d
von Willebrand Factor (Coagulation Factor VIII VW, RCoF, Ristocetin Cofactor)	plasma	50 - 150	%	0.01	0.50 - 1.50	fraction of 1.00	X.XX	0.01
Warfarin sodium, therapeutic	plasma	1.0 - 3.0	mg/L	3.243	3.3 - 9.8	µmol/L	XX.X	0.1 µmol/L
WBC Differential					3.2 - 9.8	10^9/L		
Bands	whole blood	3 - 5	%	0.01	0.03 - 0.05	fraction of 1.00	0.XX	0.01
Neutrophils	whole blood	54 - 62	%	0.01	0.54 - 0.62	fraction of 1.00	0.XX	0.01
Lymphocytes	whole blood	25 - 33	%	0.01	0.25 - 0.33	fraction of 1.00	0.XX	0.01
Monocytes	whole blood	3 - 7	%	0.01	0.03 - 0.07	fraction of 1.00	0.XX	0.01
Eosinophils	whole blood	1 - 3	%	0.01	0.01 - 0.03	fraction of 1.00	0.XX	0.01
Basophils	whole blood	0 - 0.75	%	0.01	0 - 0.0075	fraction of 1.00	0.XXXX	0.0001
Bands	whole blood	150 - 400	cells/mm^3 (µL)	1	150 - 400	10^6 cells / L	XXX	1 - 10^6 cells/L
Neutrophils	whole blood	3000 - 5800	cells/mm^3 (µL)	1	3000 - 5800	10^6 cells / L	XXXX	1 - 10^6 cells/L
Lymphocytes	whole blood	1500 - 3000	cells/mm^3 (µL)	1	1500 - 3000	10^6 cells / L	XXXX	1 - 10^6 cells/L
Monocytes	whole blood	285 - 500	cells/mm^3 (µL)	1	285 - 500	10^6 cells / L	XXX	1 - 10^6 cells/L
Eosinophils	whole blood	50 - 250	cells/mm^3 (µL)	1	50 - 250	10^6 cells / L	XXX	1 - 10^6 cells/L
Basophils	whole blood	15 - 50	cells/mm^3 (µL)	1	15 - 50	10^6 cells / L	XX	1 - 10^6 cells/L
Xylocaine (Lidocaine)	plasma, serum	1.0 - 5.0	mg/L	4.267	4.5 - 21.5	µmol/L	X.X	0.5 µmol/L
D-Xylose (25 g dose)	plasma, serum	30 - 40 (30 - 60 min)	mg/dL	0.06661	2.0 - 2.7 (30-60 min)	mmol/L	X.X	0.1 mmol/L
D-Xylose excretion (25 g dose)	urine	21 - 31 (excreted in 5 hr)	%	0.01	0.21 - 0.31 (excreted in 5 hr)	fraction of 1.00	O.XX	0.01
Zinc	serum	75 - 120	µg/dL	0.1530	11.5 - 18.5	µmol/L	XX.X	0.1 µmol/L
Zinc	urine	150 - 1200	µg/24 hr	0.01530	2.3 - 18.3	µmol/d	XX.X	0.1 µmol/d

NOTES

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