

## Hamilton Regional Laboratory Medicine Program

A Collaborative Program of the Hamilton Health Sciences,  
St. Joseph's Healthcare and McMaster University

### Clinical Chemistry SI Units

#### A – Z

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
P - Acetaminophen - Toxic	<5.0	mg/100 ml	66.16	>300	µmol/L	XXO	10 µmol/L
S - Acetoacetic acid	0.3-3.0	mg/100 ml	97.95	30-300	µmol/L	XXO	10 µmol/L
B,S - Acetone	0	mg/100 ml	172.2	0	µmol/L	XXO	10 µmol/L
P - Adrenocorticotropin	20-100	pg/ml	0.2202	4.22	pmol/L	XX	1 pmol/L

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
(ACTH)							
S - Alanine Aminotransferase (ALT)	0-35 (37°C)	U/l	1.00	0-35	U/L	XX	1 U/L
		Karmen Units/ml	0.482		U/L	XX	1 U/L
		Reltmann Frankel Units/mL	0.482		U/L	XX	1 U/L
S - Albumin	4.0-6.0	g/100 ml	10.0	40-60	g/L	XX	1 g/L
S - Aldolase	0-6 (37°C)	U/l	1.00	0-6	U/L	XX	1 U/L
		Sibley - Lehninger Units/ml	0.7440		U/L	XX	1 U/L
S - Aldosterone Normal Salt Diet Restricted Salt Diet	8.1-15.5	ng/100 ml	27.74	220-430	pmol/L	XXO	10 pmol/L
	20.8-44.4	ng/100 ml	27.74	580-1240	pmol/L	XXO	10 pmol/L
U - Aldosterone - Sodium excretion = 25 mmol/24 h = 75-125 mmol/24 h = 200 mmol/24 h	18.85	µg/24 h	2.774	50-235	nmol/d	XXX	5 nmol/d
	5.26	µg/24 h	2.774	15-70	nmol/d	XXX	5 nmol/d
	1.5-12.5	µg/24 h	2.774	5-35	nmol/d	XXX	5 nmol/d
S - Alpha-Antitrypsin	150-350	mg/100 ml	0.01	1.5-3.5	g/L	X.X	0.1 g/L
S - Alpha Fetoprotein - RIA	0-20	ng/ml	1.00	0-20	µg/L	XX	1 µg/L
Amf - Alpha Fetoprotein	Depends on gestation	mg/100 ml	10	Depends on gestation	mg/L	XX	1 mg/L
S - Alpha-2-	145-410	mg/100 ml	0.01	1.5-4.1	g/L	X.X	0.1 g/L

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
Macroglobulin							
S - Aluminum	0-15	µg/l	37.06	0-560	nmol/L	XXO	10 nmol/L
P - Amino Acid Fractionation							
Alanine	2.2-4.5	mg/100 ml	112.2	245-500	µmol/L	XXX	5 µmol/L
ΑχιρψτυβονιµΑ- αηπλ διχΑ	0.1-0.2	mg/100 ml	96.97	10-20	µmol/L	XXX	5 µmol/L
Arginine	0.5-2.5	mg/100 ml	57.40	30-145	µmol/L	XXX	5 µmol/L
Asparagine	0.5-0.6	mg/100 ml	75.69	35-45	µmol/L	XXX	5 µmol/L
Aspartic Acid	0.0-0.3	mg/100 ml	75.13	0-20	µmol/L	XXX	5 µmol/L
Citrulline	0.2-1.0	mg/100 ml	57.08	15-55	µmol/L	XXX	5 µmol/L
Cystine	0.2-2.2	mg/100 ml	41.61	10-90	µmol/L	XXX	5 µmol/L
Glutamic Acid	0.2-2.8	mg/100 ml	67.97	15-190	µmol/L	XXX	5 µmol/L
Glutamine	6.1-10.2	mg/100 ml	68.42	420-700	µmol/L	XXX	5 µmol/L
Glycine	0.9-4.2	mg/100 ml	133.2	120-560	µmol/L	XXX	5 µmol/L
Histidine	0.5-1.7	mg/100 ml	64.45	30-110	µmol/L	XXX	5 µmol/L
Hydroxyproline	0-trace	mg/100 ml	76.26	0-trace	µmol/L	XXX	5 µmol/L
Isoleucine	0.5-1.3	mg/100 ml	76.24	40-100	µmol/L	XXX	5 µmol/L
Leucine	1.0-2.3	mg/100 ml	76.24	75-175	µmol/L	XXX	5 µmol/L
Lysine	1.2-3.5	mg/100 ml	68.40	80-240	µmol/L	XXX	5 µmol/L
Methionine	0.1-0.6	mg/100 ml	67.02	5-40	µmol/L	XXX	5 µmol/L
Ornithine	0.4-1.4	mg/100 ml	75.67	30-400	µmol/L	XXX	5 µmol/L
Phenylalanine	0.6-1.5	mg/100 ml	60.54	35-90	µmol/L	XXX	5 µmol/L
Proline	1.2-3.9	mg/100 ml	86.86	105-340	µmol/L	XXX	5 µmol/L
Serine	0.8-1.8	mg/100 ml	95.16	75-170	µmol/L	XXX	5 µmol/L
Threonine	0.3-2.1	mg/100 ml	79.91	25-170	µmol/L	XXX	5 µmol/L
Tryptophan	0.9-2.5	mg/100 ml	83.95	75-210	µmol/L	XXX	5 µmol/L
Tyrosine	0.5-2.5	mg/100 ml	48.97	25-125	µmol/L	XXX	5 µmol/L
Valine	0.4-1.6	mg/100 ml	55.19	20-90	µmol/L	XXX	5 µmol/L
U - Amino Acid Nitrogen	1.7-3.7	mg/100 ml	85.36	145-315	µmol/L	XXX	5 µmol/L
U - Amino Acid Nitrogen		mg/24 h	0.07139		mmol/d		

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
P - Amino Acid Nitrogen		mg/100 ml	0.7139		mmol/L		
U - dAminolevulinate (as aminolevulinic Acid)	1.0-7.0	mg/24 h	7.626	8-53	µmol/L	XX	1 µmol/d
P,S - Amitriptyline - Therapeutic	50-200	ng/ml	3.605	180-720	nmol/L	XX0	10 nmol/L
v,P - Ammonia As Ammonia (NH <sub>3</sub> ) As Ammonium Ion (NH <sub>4</sub> <sup>+</sup> ) As Nitrogen (N)	10-80 10-85 10-65	µg/100 ml µg/100 ml µg/100 ml	0.5872 0.5543 0.7139	5-50 5-50 5-50	µmol/L µmol/L µmol/L	XXX XXX XXX	5 µmol/L 5 µmol/L 5 µmol/L
S - Amylase - Enzymatic - Somogyi/Caraway  - Roche Dye Unit  - Street-Close	0-130 (37°C) 50-150	U/l Somogyi Units/100 ml  Dye Units/ 100 ml  Street Close Units/100 ml	1.850  1.59  5.7	100-300	U/L  U/L  U/L	XX0	10 U/L
S - Androstenedione - Male > 18 years - Female > 18 years	0.2-3.0 0.8-3.0	µg/l µg/l	3.492 3.492	0.5-10.5 3.0-10.5	nmol/L nmol/L	XX.X XX.X	0.5 nmol/L 0.5 nmol/L
S - Angiotensin Converting Enzyme	<40	nmol/ml/min	16.67	<670			
H - Arsenic (as As)	<1	µg/g (ppm)	13.35	<13	nmol/g	XXX.X	0.5 nmol/g

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
U - Arsenic as As as As <sub>2</sub> O <sub>3</sub>	0-5 <25	µg/24 h µg/100 ml	13.35 0.0505	0-67 <1.3	nmol/d µmol/L	XX XX.X	1 nmol/d 0.1 µmol/L
P - Ascorbate (as Ascorbic Acid)	>0.5	mg/100 ml	56.78	>30	µmol/L	X0	10 µmol/L
S - Aspartate Aminotransferase (AST)	0-35 (37°C)	U/l Karmen Units/ml Reitmann Frankel Units/ml	1.00  0.482  0.482	0-35	U/L  U/L  U/L	XX  XX  XX	1 U/L  1 U/L  1 U/L
S - Barbiturate - Overdose Total expressed as: Phenobarbital Sodium Phenobarbital Barbitone	Depends on composition of mixture. Usually not known.	mg/100 ml mg/100 ml mg/100 ml	43.06 39.34 54.29		µmol/L µmol/L µmol/L	XX XX XX	5 µmol/L 5 µmol/L 5 µmol/L
S - Barbiturate - Therapeutic See Phenobarbital See Phentobarbital See Thiopental							
S - Bile Acids - Total (as Chenodeoxycholic Acid) Cholic Acid Chenodeoxycholic Acid Deoxycholic Acid Lithocholic Acid	Trace - 3.3 Trace - 1.0 Trace - 1.3 Trace - 1.0 Trace	µg/ml µg/ml µg/ml µg/ml µg/ml	2.547 2.448 2.547 2.547 2.656	Trace - 8.4 Trace - 2.4 Trace - 3.4 Trace - 2.6 Trace	µmol/L µmol/L µmol/L µmol/L µmol/L	X.X X.X X.X X.X X.X	0.2 µmol/L 0.2 µmol/L 0.2 µmol/L 0.2 µmol/L 0.2 µmol/L

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
Df - Bile Acids (After chole-cystokinin stimulation Total (as Chenodeoxycholic Acid) Cholic Acid Chenodeoxycholic Acid Deoxycholic Acid Lithocholic Acid	14.0-58.0 2.4-33.0 4.0-24.0 0.8-6.9 0.3-0.8	mg/ml mg/ml mg/ml mg/ml mg/ml	2.547 2.448 2.547 2.547 2.656	35.0-148.0 6.8-81.0 10.0-61.4 2.0-18.0 0.8-2.0	mmol/L mmol/L mmol/L mmol/L mmol/L	XX.X XX.X XX.X XX.X XX.X	0.2 mmol/L 0.2 mmol/L 0.2 mmol/L 0.2 mmol/L 0.2 mmol/L
S - Bilirubin, Total Conjugated	0.1-1.0 0.0-0.2	mg/100 ml mg/100 ml	17.10 17.10	2-18 0-4	µmol/L µmol/L	XX XX	2 µmol/L 2 µmol/L
S - Bromide, Toxic - - as Bromide Ion - as Sodium Bromide	>120 >150 >15	mg/100 ml mg/100 ml mEq/l	0.1252 0.09719 1.00	>15 >15 >15	mmol/L mmol/L mmol/L	XX XX XX	1 mmol/L 1 mmol/L 1 mmol/L
S - Cadmium	<3	µg/100 ml	0.08897	<0.3	µmol/L	X.X	0.1 µmol/L
S - Calcitonin		pg/ml	1.00		ng/L		
S - Calcium - Male - Female <50 yrs - Female >50 yrs	8.8-10.3 8.8-10.0 8.8-10.2	mg/100 ml mg/100 ml mg/100 ml mEq/l	0.2495 0.2495 0.2495 0.500	2.20-2.58 2.20-2.50 2.20-2.56	mmol/L mmol/L mmol/L mmol/L	X.XX X.XX X.XX X.XX	0.02 mmol/L 0.02 mmol/L 0.02 mmol/L 0.02 mmol/L
S - Calcium, Ion	2.00-2.30	mEq/l	0.500	1.00-1.15	mmol/L	X.XX	0.01 mmol/L
U - Calcium, Normal diet	<250	mg/24 h	0.02495	<6.2	mmol/d	X.X	0.1 mmol/d
P - Carbamazepine -	4.0-10.0	mg/l	4.233	17-42	µmol/L	XX	1 µmol/L

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
Therapeutic							
B, P, S - Carbon Dioxide Content (Bicarbonate + CO <sub>2</sub> )	22-28	mEq/l	1.00	22-28	mmol/L	XX	1 mmol/L
B - Carbon Monoxide (Proportion of Hb which is COHb)	<15	%	0.01	<0.15	1	X.XX	0.01
S - Carotenes - Beta	50-250	µg/100 ml	0.01863	0.9-4.6	µmol/L	X.X	0.1 µmol/L
U - Catecholamines Total, As Norepinephrine	<120	µg/24 h	5.911	<675	mg/L	XX0	10 µmol/d
S - Ceruloplasmin	20-35	mg/100 ml	10.0	200-350	mg/L	XX0	10 mg/L
P - Chlordiazepoxide-Therap - Toxic	0.5-5.0 >10.0	mg/l mg/l	3.336 3.336	2-17 >33	µmol/L µmol/L	XX XX	1 µmol/L 1 µmol/L
S - Chloride	95-105	mEq/l	1.00	95-105	mmol/L	XXX	1 mmol/L
P - Chlorimipramine (includes desmethyl metabolite)	50-400	ng/ml	3.176	150-1270	nmol/L	XX0	10 nmol/L
P - Chlorpromazine	50-300	ng/ml	3.136	150-950	nmol/L	XX0	10 nmol/L
P - Chlorpropamide - Therap	75-250	mg/l	3.613	270-900	µmol/L	XX0	10 µmol/L

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
P - Cholestanol - As a fraction of total cholesterol	1-3	%	0.01	0.01-0.03	1	X.XX	0.01
P - Cholesterol - 29 years	<200	mg/100 ml	0.02586	<5.20	mmol/L	X.XX	0.05 mmol/L
- 30-39 yrs	<225	mg/100 ml	0.02586	<5.85	mmol/L	X.XX	0.05 mmol/L
- 40-49 yrs	<245	mg/100 ml	0.02586	<6.35	mmol/L	X.XX	0.05 mmol/L
- 50+ yrs	<265	mg/100 ml	0.02586	<6.85	mmol/L	X.XX	0.05 mmol/L
P - Cholesterol Esters - As a fraction of total cholesterol	60-75	%	0.01	0.60-0.75	1	X.XX	0.01
S - Cholinesterase	620-1370 (25°C)	U/l	1.00	620-1370	U/L	XXX0	10 U/L
P - Chorionic Gonadotrophin (β-HCG)	0 if not pregnant	mlu/ml	1.00	0 if not pregnant	IU/L	XX	1 IU/L
B - Citrate (as Citric Acid)	1.2-3.0	mg/100 ml	52.05	60-160	µmol/L	XXX	5 µmol/L
S - Complement, C3	70-160	mg/100 ml	0.01	0.7-1.6	g/L	X.X	0.1 g/L
S - Complement, C4	20-40	mg/100 ml	0.01	0.2-0.4	g/L	X.X	0.1 g/L
S - Copper	70-140	µg/100 ml	0.1574	11.0-22.0	µmol/L	XX.X	0.2 µmol/L
U - Copper	<40	µg/24 h	0.01574	<0.6	µmol/d	X.X	0.2 µmol/d

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
U - Coproporphyrins	<200	µg/24 h	1.527	<300	nmol/d	XX0	10 nmol/d
S - Cortisol - 0800 h - 1600 h - 2400 h	4-19 2-15 <5	µg/100 ml µg/100 ml µg/100 ml	27.59 27.59 27.59	110-520 50-410 <140	nmol/L nmol/L nmol/L	XX0 XX0 XX0	10 nmol/L 10 nmol/L 10 nmol/L
U - Cortisol (Free)	10-110	µg/24 h	2.759	30-300	nmol/d	XX0	10 nmol/d
S - Creatine - Male - Female	0.17-0.50 0.35-0.93	mg/100 ml mg/100 ml	76.25 76.25	10-40 30-70	µmol/L µmol/L	X0 X0	10 µmol/L 10 µmol/L
U - Creatine - Male - Female	0-40 0-80	mg/24 h mg/24 h	7.625 7.625	0-300 0-600	µmol/d µmol/d	XX0 XX0	10 µmol/d 10 µmol/d
S - Creatine Kinase (CK)	0-130 (37°C)	U/l	1.00	0-130	U/L	XXX	1 U/L
S - Creatine Kinase Isoenzymes MB Fraction	>5 in myocardial infarction	%	0.01	>0.05	1	X.XX	0.01
S - Creatinine	0.6-1.2	mg/100 ml	88.40	50-110	µmol/L	XX0	10 µmol/L
U - Creatinine	Variable	g/24 h	8.840	Variable	mmol/d	XX.X	0.1 mmol/d
S, U - Creatinine Clearance	75.125	ml/min	0.01667	1.24-2.08	mL/s	X.XX	0.02 mL/s
Creatinine Clearance corrected for body surface = $\frac{\mu\text{mol/L (urine creatinine)} \times \text{mL/s} \times 1.73}{\mu\text{mol/L (serum creatinine)} \times \text{A}}$ where A is the body surface area in square metres (m <sup>2</sup> )							
B - Cyanide - Lethal	0 >0.10	mg/100 ml	384.3	>40	µmol/L	XXX	5 µmol/L
S - Cyanocobalamin (Vitamin B <sub>12</sub> )	200-1000	pg/ml	0.7378	150-750	pmol/L	XX0	10 pmol/L

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
S - Cyclic AMP	2.6-6.6	µg/l	3.038	8-20	nmol/L	XXX	1 nmol/L
U - Cyclic AMP - Total urinary	2.9-5.6	µmol/g creat.	113.1	330-630	nmol/mmol creat.	XX0	10 nmol/mmol creatinine
- Renal tubular	<2.5	µmol/g creat.	113.1	<280	nmol/mmol creat.	XX0	10 nmol/mmol creatinine
S - Cyclic GMP	0.6-3.5	µg/l	2.897	1.7-10.1	nmol/L	XX.X	0.1 nmol/L
U - Cyclic GMP	0.3-1.8	µmol/g creat.	113.1	30-200	nmol/mmol creat.	XX0	10 nmol/mmol creatinine
U - Cystine	10-100	mg/24 h	4.161	40-420	µmol/d	XX0	10 µmol/d
P, S - Dehydroepiandrosterine (DHEA) - 1-4 years	0.2-0.4	µg/l	3.467	0.6-1.4	nmol/L	XX.X	0.2 nmol/L
- 4-8 years	0.1-1.9	µg/l	3.467	0.4-6.6	nmol/L	XX.X	0.2 nmol/L
- 8-10 years	0.2-2.9	µg/l	3.467	0.6-10.0	nmol/L	XX.X	0.2 nmol/L
- 10-12 years	0.5-9.2	µg/l	3.467	1.8-31.8	nmol/L	XX.X	0.2 nmol/L
- 12-14 years	0.9-20.0	µg/l	3.467	3.2-69.4	nmol/L	XX.X	0.2 nmol/L
- 14-16 years	2.5-20.0	µg/l	3.467	8.6-69.4	nmol/L	XX.X	0.2 nmol/L
Pre-menopausal female	2.0-15.0	µg/l	3.467	7.0-52.0	nmol/L	XX.X	0.2 nmol/L
Male	0.8-10.0	µg/l	3.467	2.8-34.6	nmol/L	XX.X	0.2 nmol/L
U - Dehydroepiandrosterone	See steroids fractionation						
P, S Dehydroepiandrosterone sulphate (DHEA-S)	1670-3640	ng/ml	0.002714	4.5-9.9	µmol/L	XX.X	0.1 µmol/L

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
Newborn	100-600	ng/ml	0.002714	0.3-1.6	µmol/L	XX.X	0.1 µmol/L
Pre-pubertal children	2000-3350	ng/ml	0.002714	5.4-9.1	µmol/L	XX.X	0.1 µmol/L
Male	820-3380	ng/ml	0.002714	2.2-9.2	µmol/L	XX.X	0.1 µmol/L
Female	100-610	ng/ml	0.002714	0.3-1.7	µmol/L	XX.X	0.1 µmol/L
(premenopausal)	230-1170	ng/ml	0.002714	0.6-3.2	µmol/L	XX.X	0.1 µmol/L
Female (postmenopausal)							
Pregnancy (term)							
S - 11-Deoxycortisol	0-2	µg/100 ml	28.86	0-60	nmol/L	XX0	10 nmol/L
P - Desipramine - Therapeutic	50-200	ng/ml	3.754	170-700	nmol/L	XX0	10 nmol/L
P - Diazepam - Therapeutic	0.10-0.25	mg/l	3512	350-900	nmol/L	XXO	10 nmol/L
- Toxic	>1.0	mg/l	3512	>3510	nmol/L	XXO	10 nmol/L
P - Docoumarol - Therapeutic	8-30	mg/l	2.974	25-90	µmol/L	XX	5 µmol/L
P - Digoxin - Therapeutic	0.5-2.2	ng/ml	1.281	0.6-2.8	nmol/L	X.X	0.1 nmol/L
	0.5-2.2	µg/l	1.281	0.6-2.8	nmol/L	X.X	0.1 nmol/L
- Toxic	<2.5	ng/ml	1.281	>3.2	nmol/L	X.X	0.1 nmol/L
P - Dimethadione - Therapeutic	<1.00	g/l	7.745	<7.7	mmol/L	X.X	0.1mmol/L
P - Diphenylhydantoin - Therapeutic	10.20	mg/l	3.964	40-80	µmol/L	XX	5 µmol/L
- Toxic	>30	mg/l	3.964	>120	µmol/L	XX	5 µmol/L
P - Disopyramide - Therapeutic	2.0-6.0	mg/l	2.946	6-18	µmol/L	XX	1 µmol/L

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
P - Doxepin - Therapeutic	50-200	ng/ml	3.579	180-720	nmol/L	XX0	10 nmol/L
S - Electrophoresis, Protein	60-65	%	0.01	0.60-0.65	1	X.XX	0.01
Albumin	1.7-5.0	%	0.01	0.02-0.05	1	X.XX	0.01
Alpha 1	6.7-12.5	%	0.01	0.07-0.13	1	X.XX	0.01
Alpha 2	8.3-16.3	%	0.01	0.08-0.16	1	X.XX	0.01
Beta	10.7-20.0	%	0.01	0.11-0.20	1	X.XX	0.01
Gamma	3.6-5.2	g/100 ml	10.0	36-52	g/L	XX	1 g/L
Albumin	0.1-0.4	g/100 ml	10.0	1-4	g/L	XX	1 g/L
Alpha 1	0.4-1.0	g/100 ml	10.0	4-10	g/L	XX	1 g/L
Alpha 2	0.5-1.2	g/100 ml	10.0	5-12	g/L	XX	1 g/L
Beta	0.6-1.6	g/100 ml	10.0	6-16	g/L	XX	1 g/L
Gamma							
P - Epinephrine (Radio-enzymatic Procedure) (at rest for 15 mins)	31-95 (at rest for 15 mins)	pg/ml	5.458	170-520	pmol/L	XX0	10 pmol/L
U - Epinephrine (Fluorimetric Procedure)	<10	g/24 h	5.458	<55	nmol/d	XX	5 nmol/d
S - Estradiol - Male >18 years	15-40	pg/ml	3.671	55-150	pmol/L	XXX	1 pmol/L
U - Estriol (non-pregnant)	4-25	g/24 h	3.468	15-85	nmol/d	XXX	5 nmol/d
Onset of menstration	28-99	g/24 h	3.468	95-345	nmol/d	XXX	5 nmol/d
Ovulation Peak	22-105	g/24 h	3.468	75-365	nmol/d	XXX	5 nmol/d
Luteal Peak	1.4-19.6	g/24 h	3.468	5-70	nmol/d	XXX	5 nmol/d
Menopausal Women	5-18	g/24 h	3.468	15-60	nmol/d	XXX	5 nmol/d
Male							
S - Estrogens (As							

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
Estradiol) Female Peak Production Male	20-300 200-800 <50	pg/ml pg/ml pg/ml	3.671 3.671 3.671	70-1100 750-2900 <180	pmol/L pmol/L pmol/L	XXX0 XXXO XXO	10 pmol/L pmol/L pmol/L
U - Estrogens, Placental (as Estriol)	Depends on period of gestation	mg/24 h	3.468	Depends on period of gestation	mol/d	XXX	1 mol/d
T - Estrogen Receptors Negative Doubtful Positive	0-3 4-1 >10	fmol estradiol bound/mg cytosol protein fmol estradiol bound/mg cytosol protein fmol estradiol bound/mg cytosol protein	1.00 1.00 1.00	0.3 4-10 >10	fmol estradiol/mg cytosol	XXX XXX XXX	1 fmol/mg protein 1 fmol/mg protein 1 fmol/mg protein
P, S - Estrone Female 1-10 days of cycle Female 11-20 days of cycle Female 21-30 days of cycle Male	43-180 75-196 131-201 29-75	pg/ml pg/ml pg/ml pg/ml	3.699 3.699 3.699 3.699	160-665 275-725 485-745 105-275	pmol/L pmol/L pmol/L pmol/L	XXX XXX XXX XXX	5 pmol/L 5 pmol/L 5 pmol/L 5 pmol/L

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
U - Estrone - Female	2-25	g/24 h	3.699	5-90	nmol/d	XXX	5 nmol/d
P - Ethanol Legal Limit (Driving) Toxic	<80 >100	mg/100 ml mg/100 ml	0.2171 0.2171	<17 >22	mmol/L mmol/L	XX XX	1 mmol/L 1 mmol/L
P - Ethchlorvynol - Toxic	>40	mg/l	6.915	>280	mol/L	XX0	100 mol/L
P - Ethosuximide Therapeutic	40-110	mg/l	7.084	280-780	mol/L	XX0	10 mol/L
P - Ethylene Glycol - Toxic	>30	mg/100 ml	0.1611	>5	mmol/L	XX	1 mmol/L
F - Faecal Fat (As Stearic Acid)	2.0-6.0	g/24 h	3.515	7-21	mmol/d	XX	1 mmol/d
cP - Fatty Acids, Non- esterified	8-20	mg/100 ml	10.00	80-200	mg/L	XX0	10 mg/L
S - Ferritin	18-300	ng/ml	1.00	18-300	g/L	XX0	10 g/L
P - Fibrinogen	200-400	mg/100 ml	0.01	2.0-4.0	g/L	X.X	0.1 g/L
U - Fluoride	<1.0	mg/24 h	52.63	<50	mol/d	XX0	10 nmol/L
S - Folate (As Pteroylglutamic Acid)	2-10	ng/ml g/100 ml	2.226 22.66	4-22	nmol/L nmol/L	XX	2 nmol/L 2 nmol/L
Erc-Folate	140-960	ng/ml	2.266	550-2200	nmol/L	XX0	10 nmol/L
P - Follicle Stimulating Hormone (FSH) Female Peak Production	2.0-15.0 20-50	mlu/ml mlu/ml	1.00 1.00	2-15 20-50	IU/L IU/L	XX XX	1 IU/L 1 IU/L

The College of Nurses of Ontario gratefully acknowledges permission granted from *Hamilton Regional Laboratory Medicine Program* to disseminate this conversion table.

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
Male	1.0-10.0	mlu/ml	1.00	1-10	IU/L	XX	1 IU/L
U - Follicle Stimulating Hormone(FSH)							
Follicular phase	2-15	Iu/24 h	1.00	2-15	IU/d	XXX	1 IU/d
Midcycle	8-40	Iu/24 h	1.00	8-40	IU/d	XXX	1 IU/d
Luteal Phase	2-10	Iu/24 h	1.00	2-10	IU/d	XXX	1 IU/d
Menopausal Woman	35-100	Iu/24 h	1.00	35-100	IU/d	XXX	1 IU/d
Male	2-15	Iu/24 h	1.00	2-15	IU/d	XXX	1 IU/d
P - Fructose	<10	mg/100 ml	0.05551	<0-6	mmol/L	X.XX	0.1 mmol/L
P - Galactose (children)	<20	mg/100 ml	0.05551	<1.1	mmol/L	X.XX	0.1 mmol/L
B - Gases (arterial)							
pO2	75-105	mmHg (= Torr)	0.1333	10.0-14.0	kPa	XX.X	0.1 kPa
pCO2	33-44	mmHg (= Torr)	0.1333	4.4-5.9	kPa	X.x	0.1 kPa
S - γ-Glutamyl Transferase (GGT)	0-30 (30°C)	U/l	1.00	0-30	U/L	XX	1 U/L
S - Gastrin	0-180	pg/ml	1	0-180	ng/L	XX0	10 ng/L
S - Globulins (see Immunoglobulins)							
S - Glucagon	50-100	pg/ml	1	50-100	ng/L	XX0	10 ng/L
P - Glucose - Fasting	70-110	mg/100 ml	0.05551	3.9-6.1	mmol/L	XX.X	0.1 mmol/L
Sf - Glucose	50-80	mg/100 ml	0.05551	2.8-4.4	mmol/L	XX.X	0.1 mmol/L
P - Glutethimide							

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
Therapeutic Toxic	<10 >20	mg/l mg/l	4.603 4.603	<46 >92	mol/L mol/L	XX XX	1 mol/L 1 mol/L
S - Glycerol (Free)	<1.5	mg/100 ml	0.1086	<0.16	mmol/L	X.XX	0.01 mmol/L
S - Gold - Therapeutic	300-800	g/100 ml	0.05077	15.0-40.0	mol/L	XX.X	0.1 mol/L
U - Gold	<500	g/24 h	0.005077	<2.5	mol/d	X.X	0.1 mol/d
P, S - Growth Hormone Male (Fasting) Female (Fasting)	0.0-5.0 0.0-10.0	ng/ml ng/ml	1.00 1.00	0.0-5.0 0.0-10.0	g/L g/L	XX.X XX.X	0.5 g/L 0.5 g/L
S - Haptoglobin	50-220	mg/100 ml	0.01	0.50-2.20	g/L	X.XX	0.01 g/L
B - Hemoglobin Male Female (See Hematology Section, Table 1A)	14.0-18.0 11.5-15.5	g/100 ml g/100 ml	10.0 10.0	140-180 115-155	g/L g/L	XXX XXX	1 g/L 1 g/L
U - Homogentisate (As Homogentistic Acid)	0	mg/24 h	5.947	0	mol/d	XX	5 mol/d
U - Homovanillate (As Homovanillic Acid)	<8	mg/24 h	5.489	<45	mol/d	XX	5 mol/d
S - B-Hydroxybutyrate (As B-Hydroxybutyric Acid)	<1.0	mg/100 ml	96.05	<100	mol/L	XX0	10 mol/L
U - 5- Hydroxyindoleacetate (As 5-Hydroxyindole Acetic Acid -5 HIAA)	2-8	mg/24 h	5.230	10-40	mol/d	XXX	5 mol/d

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
S, P - 17 a Hydroxyprogesterone Children Male Female Female, post-menopausal	0.2-1.4 0.5-2.5 0.3-4.2 0.3-1.7	g/l g/l g/l g/l	3.026 3.026 3.026 3.026	0.5-4.5 1.5-7.5 1.0-13.0 1.0-5.0	nmol/L nmol/L nmol/L nmol/L	XX.X XX.X XX.X XX.X	0.5 nmol/L 0.5 nmol/L 0.5 nmol/L 0.5 nmol/L
U - Hydroxyproline 1 wk-1 yr 1-13 yrs 22-65 hrs 66+ yrs	55-220 25-80 6-22 5-17	mg/24 h/m mg/24 h/m mg/24 h/m mg/24 h/m	7.626 7.626 7.626 7.626	420-1680 190-610 40-170 40-130	mol-d m mol-d m mol-d m mol-d m	XX0 XX0 XX0 XX0	10 mol d m 10 mol d m 10 mol d m 10 mol d m
S - Immunoglobulins IgG IgA IgM IgD IgE - 0-3 yrs IgE - 3-80 yrs	500-1200 50-350 30-230 <6 0.5-10 5-100	mg/100 ml mg/100 ml mg/100 ml mg/100 ml U/ml U/ml	0.01 0.01 0.01 10 2.4 2.4	5.00-12.00 0.50-3.50 0.30-2.30 <60 1-24 12-240	g/L g/L g/L mg/L g/L g/L	XX.XX XX.XX XX.XX XXO XX XX	0.01 g/L 0.01 g/L 0.01 g/L 10 mg/L 1 g/L 1 g/L
P - Imipramine - Therapeutic	50-200	ng/ml	3.566	180-710	nmol/L	XX0	10 nmol/L
P, S - Insulin	5-20 5-20 0.20-0.84	U/ml mU/l g/l	7.175 7.175 172.2	35-145 35-145 35-145	pmol/L pmol/L pmol/L	XXX XXX XX	5 pmol/L 5 pmol/L 5 pmol/L
S - Iron Male Female	80-180 60-160	g/100 ml g/100 ml	0.179 0.1791	14-32 11-29	mol/L mol/L	XX XX	1 mol/L 1 mol/L
S - Iron Binding	250-460	g/100 ml	0.1791	45-82	mol/L	XX	1 mol/L

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
Capacity							
P - Isoniazid Therapeutic Toxic	<2.0 >3-0	mg/l mg/l	7.291 7.291	<15 >22	mol/L mol/L	XX XX	1 mol/L 1 mol/L
P - Isopropanol	0	mg/100 ml	0.1664	0	mmol/L	XX	1 mmol/L
P - Lactate (As Lactic Acid)	0.5-2.0 5-20	mEq/l mg/100 ml	1.00 0.1110	0.5-2.0 0.5-2.0	mmol/L mmol/L	X.X X.X	0.1 mmol/L 0.1 mmol/L
S - Lactate Dehydrogenase (L-P)	50-150(37°C)	U/l	1.00	50-150	U/L	XXX	1 U/L
		Wroblewski Units/ml	0.482		U/L	XXX	1 U/L
S - Lactate Dehydrogenase Iso-enzymes							
LD1	17-31	%	0.01	0.17-0.31	1	X.XX	0.01
LD2	35-48	%	0.01	0.35-0.48	1	X.XX	0.01
LD3	15-29	%	0.01	0.15-0.29	1	X.XX	0.01
LD4	4-9	%	0.01	0.04-0.09	1	X.XX	0.01
LD5	3-10	%	0.01	0.03-0.10	1	X.XX	0.01
LD1	0-60	U/l	1	0-60	U/L	XX	1 U/L
LD2	0-70	U/l	1	0-70	U/L	XX	1 U/L
LD3	0-45	U/l	1	0-45	U/L	XX	1 U/L
LD4	0-30	U/l	1	0-30	U/L	XX	1 U/L
LD5	0-30	U/l	1	0-30	U/L	XX	1 U/L
B - Lead - Toxic	>60	g/100 ml mg/100 ml	0.04826 48.26	>2.90	mol/L mol/L	X.XX X.XX	0.05 mol/L 0.05 mol/L
U - Lead - Toxic	>80	g/24 h	0.004826	>0.40	mol/d	X.XX	0.05 mol/d

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
P - Lidocaine (Xylocaine)	1.0-5.0	mg/l	4.267	4.5-21.5	mol/L	X.X	0.5 mol/L
S - Lipase	0-160 (30°C)	U/l Cherry Crandall (Tietz Fiereck)	1.00	0-160	U/L	XX0	10 U/L
	<2		278	<560	U/L	XXO	10 U/L
P - Lipids, Total	400-850	mg/100 ml	0.01	4.0-8.5	g/L	X.X	0.1 g/L
P - Lipoproteins Low Density (LDL) As cholesterol High Density (LDL) As cholesterol	50-190	mg/100 ml	0.02586	1.30-4.90	mmol/L	X.XX	0.05 mmol/L
	30-70	mg/100 ml	0.02586	0.80-1.80	mmol/L	X.XX	0.05 mmol/L
S - Lithium Ion - Therapeutic	0.50-1.50	mEq/l	1.00	0.50-1.50	mmol/L	X.XX	0.05 mmol/L
		g/100 ml	0.001441		mmol/L	X.XX	0.05 mmol/L
		mg/100 ml	1.441		mmol/L	X.XX	0.05 mmol/L
S - Luteinizing Hormone Male Female Peak Production	3-25	mlu/ml	1.00	3-25	IU/L	XXX	1 IU/L
	2-20	mlu/ml	1.00	2-20	IU/L	XXX	1 IU/L
	30-140	mlu/ml	1.00	30-140	IU/L	XXX	1 IU/L
S - Lysozyme (Muramidase)	1-15	g/ml	1.00	1-15	mg/L	XXX	1 mg/L
U - Lysozyme (Muramidase)	<2	g/ml	1.00	<2	mg/L	XX	1 mg/L
S - Magnesium	1.8-3.0	mg/100 ml	0.4114	0.80-1.20	mmol/L	X.XX	0.02 mmol/L
	1.6-2.4	mEq/l	0.500	0.80-1.20	mmol/L	X.XX	0.02 mmol/L

The College of Nurses of Ontario gratefully acknowledges permission granted from *Hamilton Regional Laboratory Medicine Program* to disseminate this conversion table.

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
P - Maprotiline - Therapeutic	50-200	ng/ml	3.605	180-720	nmol/L	XX0	10 nmol/L
P - Meprobamate Therapeutic Toxic	<20 >40	mg/l mg/l	4.582 4.582	<90 >180	mol/L mol/L	XX0 XX0	10 mol/L 10 mol/L
B - Mercury Normal Chronic Exp.	<1.0 >20	g/100 ml g/100 ml	49.85 0.04985	<50 >1.00	nmol/L mol/L	XX0 X.XX	10 nmol/L 0.01 mol/L
U - Mercury Normal Exposure Organic Inorganic	<30 >45 >450	g/24 h g/24 h g/24 h	4.985 0.004985	<150 >220 >2.20	nmol/d nmol/d mol/d	XX0 XX0 X.XX	10 nmol/d 10 nmol/d,br>0.01 mol/d
U - Metanephrines (As normetanephrine)	0.0-2.0	mg/24 h	5.458	0-11.0	mol/d	XX.X	0.5 mol/d
P - Methanol	0	mg/100 ml	0.3121	0	mmol/L	XX	1 mmol/L
P - Methaqualone Therapeutic Toxic	<10 >30	mg/l mg/l	3.995 3.995	<40 >120	mol/L mol/L	XX0 XX0	10 mol/L 10 mol/L
S - Methotrexate - Toxic	>2-3	mg/l	2.200	>5.0	mol/L	X.X	0.1 mol/L
P - Methsuximide (as Desmethysuximide) Therapeutic	10-40	mg/l	5.285	50-210	mol/L	XX0	10 mol/L
P - Methyprylon Therapeutic Toxic	<10 >40	mg/l mg/l	5.457 5.457	<50 >220	mol/L mol/L	XX0 XX0	10 mol/L 10 mol/L

The College of Nurses of Ontario gratefully acknowledges permission granted from *Hamilton Regional Laboratory Medicine Program* to disseminate this conversion table.

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
S - B Microglobulin - <50 yrs	0.80-2.40	mg/l	84.75	68-204	nmol/L	XXX	2 nmol/L
U - B Microglobulin - <50 yrs	<140	g/24 h	0.08475	<12	nmol/d	XXX	2 nmol/L

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
U - Nitrogen - Total	Diet dependent	g/24 h	71.38	Diet dependent	mmol/d	XX0	L 10 mmol/d
P - Norepinephrine (Radio-enzymatic Procedure) (at rest for 15 mins.)	215-475	pg/ml	0.005911	1.27-2.81	nmol/L	X.XX	0.01 nmol/L
U - Norepinephrine (Fluorimetric Procedure)	<100	g/24 h	5.911	<590	nmol/d	XX0	10nmol/d
P - Nortriptyline Therapeutic	25-200	ng/ml	3.797	90-760	nmol/L	XX0	10 nmol/L
P - Osmolality	280-300	mOsm/kg	1.00	280-300	mmol/kg	XXX	1 mmol/kg
U - Osmolality	50-1200	mOsm/kg	1.00	50-1200	mmol/kg	XXX	1 mmol/kg

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
U - Oxalate (As anhydrous Oxalic Acid) Amf - Palmitic Acid	10-40 Depends on gestation	mg/24 h mmol/l	11.11 1000	110-440 Depends on gestation	mol/d mol/L	XX0 XXX	10mol/d 5mol/L
P - Pentobarbital	20-40'	mg/l	4.419	90-170	mol/L	XX	5 mol/L
P - Phenobarbital Therapeutic	2-5	mg/100 ml	43.06	85-215	mol/L	XXX	5 mol/L
P - Phensuximide	4-8	mg/l	5.285	20-40	mol/L	XX	5 mol/L
P - Phenylbutazone Therapeutic	<100	mg/l	3.243	<320	mol/L	XX0	10 mol/L
P - Phenytoin See Dipenylhydantoin							
P - Phosphatase, Acid (Prostatic)	0-3	King Armstrong units/100 ml Bodansky units/ 100 ml Kind-King units/ 100 ml Bessey- Lowry- Brock units/100 ml	1.77 5.37 1.77 16.67	0-5.5	U/L U/L U/L U/L	X.X X.X X.X X.X	0.5 U/L 0.5 U/L 0.5 U/L 0.5 U/L
S - Phosphatase, Alkaline	30-120	King Armstrong units/100 ml Bodansky	1.77 5.37	30-120	U/L U/L	X.X X.X	1 U/L 1 U/L

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
		units/ 100 ml Kind-King	7.1		U/L	X.X	1 U/L
		units/ 100 ml Bessey- Lowry- Brock	16.67		U/L	X.X	1 U/L
		units/100 ml					
S - Phosphate (As Phosphorus, Inorganic)	2.5-5.0	mg/100 ml	0.3229	0.80-1.60	mmol/L	X.XX	0.05 mmol/L
U - Phosphate (As Phosphorus, Inorganic)	Diet dependent	gm/24 h	32.29	Diet dependent	mmol/d	XXX	1 mmol/d
P - Phospholipid Phosphorus, Total	5-12	mg/100 ml	0.3229	1.60-3.90	mmol/L	X.XX	0.05 mmol/L
Erc - Phospholipid Phosphorus, Total	1.2-12.0	mg/100 ml	0.3229	0.40-3.90	mmol/L	X.XX	0.05 mmol/L
P - Phospholipids - Substance fraction of total phospholipid	65-70	% of total	0.01	0.65-0.70	1	X.XX	0.01
Phosphatidyl Choline	4-5	% of total	0.01	0.04-0.05	1	X.XX	0.01
Phosphatidyl Ethanolamine	15-20	% of total	0.01	0.15-0.20	1	X.XX	0.01
Sphingomyelin	3-5	% of total	0.01	0.03-0.05	1	X.XX	0.01
Lysophosphatidyl choline							
Erc - Phospholipids Substance fraction of total phospholipid	28-33	% of total	0.01	0.28-0.33	1	X.XX	0.01

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
Phosphatidyl Choline	24-31	% of total	0.01	0.24-0.31	1	X.XX	0.01
Phosphatidyl Ethanolamine	22-29	% of total	0.01	0.22-0.29	1	X.XX	0.01
Sphingomyelin	12-20	% of total	0.01	0.12-0.20	1	X.XX	0.01
Phosphatidyl Serine+	1-2	% of total	0.01	0.01-0.02	1	X.XX	0.01
Phosphatidyl Inositol							
Lysophosphatidyl Choline							
P - Phytanic Acid	Trace - 0.3	mg/100 ml	32.00	<10	mol/L	XX	5 mol/L
S - (Human) Placental Lactager (HPL)	>4.0 After 30 wks gestation	g/ml	46.30	>180	nmol/L	XXX	10 nmol/L
U - Porphobilinogen Porphyrins	0.0-2.0	mg/24 h	4.420	0-8.8	mol/d	X.X	0.5 mol/d
U - Coproporphyrin	45-180	g/24 h	1.527	68-276	nmol/d	XXX	2 nmol/d
Erc - Protoporphyrin	15-50	g/100 ml	0.0177	0.28-0.90	mol/L	X.XX	0.02 mol/L
U - Uroporphyrin	5-20	ug/24 h	1.204	6-24	nmol/d	XX	2 nmol/d
Erc - Uroporphyrinogen Synthetase	22-42	mmol/ml/h	0.2778	6.0-11.8	mmol L s	X.X	0.2 mmol L s
S - Potassium Ion	3.5-5.0	mEq/1 mg/100 ml	1.00 0.2558	3.5-5.0	mmol/L mmol/L	X.X X.X	0.1 mmol/L 0.1 mmol/L
U - Potassium Ion (Diet Dependent)	25-100	mEq/24 h	1.00	25-100	mmol/d	XX	1 mmol/d
U - Pregnanediol Normal Pregnancy	1.0-6.0 Depends on	mg/24 h	3.120	3.0-18.5	mol/d	XX.X	0.5 mol/d

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
	gestation						
U - Pregnanetriol	0.5-2.0	mg/24 h	2.972	1.5-6.0	mol/d	XX.X	0.5 mol/d
P-Primidone Therapeutic Toxic	6.0-10.0 >10.0	mg/l mg/l	4.582 4.582	25-46 >46	mol/L mol/L	XX XX	1 mol/L 1 mol/L
P - Procainamide Therapeutic Toxic	4-0-8.0 >12.0	mg/l mg/l	4.249 4.249	17-34 >50	mol/L mol/L	XX XX	1 mol/L 1 mol/L
P - N Acetylprocainamide Therapeutic	4.0-8.0	mg/l	3.606	14-29	mol/L	XX	1 mol/L
P - Progesterone Follicular phase Luteal phase	<2 2-20	ng/ml ng/ml	3.180 3.180	<6 6-64	nmol/L nmol/L	XX XX	2 nmol/L 2 nmol/L
T - Progesterone Receptors Negative Doubtful Positive	0-3 4-10 >10	fmol progesterone bound/mg cytosol protein	1.00 1.00 1.00	0-3 4-10 >10	fmol progesterone bound/mg cytosol protein	XXX XXX XXX	1 fmol/mg protein
P - Prolactin	<20	ng/ml	1.00	<20	g/L	XX	1 g/L
P - Propoxyphene Toxic	>2.0	mg/l	2.946	>5.9	mol/L	X.X	0.1 mol/L
P - Propranolol (Inderal) Therapeutic	50-200	ng/ml	3.856	190-770	nmol/L	XX0	10 nmol/L
S - Protein, Total	6.0-8.0	g/100 ml	10.0	60-80	g/L	XX	1 g/L
Sf - Protein, Total	<40	mg/100 ml	0.01	<0.40	g/L	X.XX	0.01 g/L

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
U - Protein, Total	<150	mg/24 h	0.001	<0.15	g/d	X.XX	0.01 g/d
P - Protryptiline	100-300	ng/ml	3.797	380-1140	nmol/L	XX0	10 nmol/L
B - Pyruvate (As Pyruvic Acid)	0.30-0.90	mg/100 ml	113.6	35-100	mol/L	XXX	1 mol/L
P - Quinidine Therapeutic Toxic	1.5-3.0 >6.0	mg/l mg/l	3.082 3.082	4.6-9.2 >18.5	mol/L mol/L	X.X X.X	0.1 mol/L 0.1 mol/L
P - Renin Nomal Sodium Diet Restricted Sodium Diet	1.1-4.1 6.2-12.4	ng/ml/h ng/ml/h	0.2778 0.2778	0.30-1.14 1.72-3.44	ng L s ng L s	X.XX X.XX	0.02 ng L s 0.02 ng L s
S-Salicylate (Salicylic Acid) Toxic	>20	mg/100 ml	0.07240	>1.45	mmol/L	X.XX	0.05 mmol/L
B - Serotonin (5-hydroxytryptamine)	8-21	g/100 ml	0.05675	0.45-1.20	mol/L	X.XX	0.05 mol/L
S - Sodium Ion	135-147	mEq/l	1.00	135-147	mmol/L	XXX	1 mmol/L
U - Sodium Ion	Diet dependent	mEq/24 h	1.00	Diet dependent	mmol/d	XXX	1 mmol/d
<b>Steroids:</b>							
U - 17 Hydroxy-corticosteroids (As Cortisol) Female Male	2.0-8.0 3.0-10.0	mg/24 h mg/24 h	2.759 2.759	5-25 10-30	mol/d mol/d	XX XX	1 mol/d 1 mol/d
U - 17 Ketogenic							

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
Steroids (As Dehydroepiandrosterone) Female Male	7.0-12.0 9.0-17.0	mg/24 h mg/24 h	3.467 3.467	25-40 30-60	mol/d mol/d	XX XX	1 mol/d 1 mol/d
U - 17 Ketosteroids (As Dehydroepiandrosterone) Female Male	6.0-17.0 6.0-20.0	mg/24 h mg/24 h	3.467 3.467	20-60 20-70	mol/d mol/d	XX XX	1 mol/d 1 mol/d
U - Ketosteroid Fractions <i>Androsterone</i> Female Male <i>Dehydroepiandrosterone</i> Female Male <i>Etiохоianolone</i> Female Male	0.5-3.0 2.0-5.0 0.2-1.8 0.2-2.0 0.8-4.0 1.4-5.0	mg/24 h mg/24 h mg/24 h mg/24 h mg/24 h mg/24 h	3.443 3.443 3.467 3.467 3.443 3.443	1-10 7-17 1-6 1-7 2-14 4-17	mol/d mol/d mol/d mol/d mol/d mol/d	XX XX XX XX XX XX	1 mol/d 1 mol/d 1 mol/d 1 mol/d 1 mol/d 1 mol/d
B - Sulfonamides as Sulfanilamide Therapeutic	10.0-15.0	mg/100 ml	58.07	580-870	mol/L	XX0	10 mol/L
P - Testosterone Female Male	0.6 4.0-8.0	ng/ml ng/ml	3.467 3.467	2.0 14.0-28.0	nmol/L nmol/L	XX.X XX.X	0.5 nmol/L 0.5 nmol/L
P- Theophylline Therapeutic	10.0-20.0	mg/l	5.55	55-110	mol/L	XX	1 mol/L
P - Thiocyanate (Nitroprusside toxicity)	10	mg/100 ml	0.1722	1.7	mmol/L	X.XX	0.1 mmol/L

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
P - Thiopental	individual	mg/l	4.126	individual	mol/L	XX	5 mol/L
<b>Thyroid Tests:</b>							
S - Thyroid Stimulating Hormone (TSH)	2-11	uU/ml	1.00	2-11	mU/L	XX	1 mU/L
S - Thyroxine (T.)	4.0-11.0	g/100 ml	12.87	51-142	nmol/L	XXX	1nmol/L
S -Thyroxine Binding Globulin (TSG) - as thyroxine	12.0-28.0	g/100 ml	12.87	150-360	nmol/L	XX0	1 nmol/L
S - Thyroxine - Free	0.8-2.8	ng/100 ml	12.87	10-36	pmol/L	XX	1 pmol/L
S - Triiodothyronine (T)	75-220	ng/100 ml	0.01536	1.2-3.4	nmol/L	X.X	0.1 nmol/L
S - T Uptake	25-35	%	0.01	0.25-0.35	1	X.XX	0.01
P - Tolbutamide Therapeutic	50-120	mg/l	3.699	180-450	mol/L	XX0	10 mol/L
S - Transferrin (B-Siderophilin)	170-370	mg/100 ml	0.01	1.70-3.70	g/L	X.XX	0.0 g/L
P - Triglycerides (as Triolein)	<160	mg/100 ml	0.01129	<1.80	mmol/L	X.XX	0.02 mmol/L
P - Trimethadione Therapeutic	<50	mg/l	6.986	<350	mol/L	XX0	10 mol/L
P - Trimipramine Therapeutic	50-200	ng/ml	3.397	170-680	nmol/L	XX0	10 nmol/L
S - Urate (As Uric Acid)	2.0-7.0	mg/100 ml	59.48	120-420	mol/L	XX0	10 mol/L

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
U - Urate (As Uric Acid)	Diet Dependent	g/24 h	5.948	Diet Dependent	mmol/d	XX	1 mmol/d
S - Urea Nitrogen	8-18	mg/100 ml	0.357	3.0-6.5	mmol/L UREA	X.X	0.5 mmol/L
U - Urea Nitrogen	12.0-20.0 Diet Dependent	g/24 h	35.70	450-700	mmol/d UREA	XX0	10 mmol/d
U - Urobilinogen	0.0-4.0	mg/24 h	1.693	0.0-6.8	µmol/d	X.X	0.1 µmol/d
P - Valproic Acid Therapeutic	50-100	mg/l	6.934	350-700	mol/L	XX0	10 mol/L
U - Vanilylmandelic Acid (VMA) *This is a misnomer, but because of its popularity the name VMA has been retained in this publication. In many publications it is being referred to as 4-hydroxy-3-methoxy mandelic acid.	<6-8	mg/24 h	5.046	<35	mol/d	XX	1 mol/d
P, S - Vitamin A (Retinol)	10-50	g/100 ml	0.03491	0.35-1.75	mol/L	X.XX	0.05 mol/L
U - Vitamin B, (Thiamine hydrochloride)	60-500	g/24 h	0.002965	0.18-1.48	mol/d	X.XX	0.01 mol/d
S - Vitamin B (Riboflavin)	2.6-3.7	g/100 ml	26.57	70-100	nmol/L	XXX	5 nmol/L
B - Vitamin B (Pyridoxal)	20-90	ng/ml	5.982	120-540	nmol/L	XXX	5 nmol/L

CLINICAL CHEMISTRY SYSTEM COMPONENT	PRESENT REFERENCE INTERVALS (Examples)	PRESENT UNIT	CONVERSION FACTOR	SI REFERENCE INTERVALS	SI UNIT SYMBOL	SIGNIFICANT DIGITS	SUGGESTED MINIMUM INCREMENT
P, S - Vitamin B (Cyanocobalamin)	200-1000	pg/ml ng/100 ml	0.7378 7.378	150-750	pmol/L pmol/L	XX0	10 pmol/L
B, P, S - Vitamin C (See Ascorbate)							
P - Vitamin D (Cholecalciferol) 25 OH-Cholecalciferol	24-40 18-36	ng/ml ng/ml	2.599 2.496	60-105 45-90	nmol/L nmol/L	XXX XXX	5 nmol/L 5 nmol/L
P, S - Vitamin E (Tocopherol)	0.78-1.25	mg/100 ml	23.22	18-29	mol/L	XX	1 mol/L
P - Warfarin Therapeutic	1.0-3.0	mg/l	3.243	3.3-9.8	mol/L	XX.X	0.1 mol/L
U - Xanthine Hypoxanthine	5-30	mg/24 h mg/24 h	6.574 7.347	30-200	mol/d mol/d	XX0 XX0	10 mol/d 10 mol/d
B - D-Xylose (25 g dose)	30-40 (30-60 min)	mg/100 ml	0.06661	2.0-2.7 (30-60 min)	mmol/L	X.X	0.1 mmol/L
U - D-Xylose Excretion (25 g dose)	21-31 (excreted in 5 h)	%	0.01	0.21-0.31 (excreted in 5 h)	1	X.XX	0.01
S - Zinc	75-120	g/100 ml	0.1530	11.5-18.5	mol/L	XX.X	0.1 mol/L
U - Zinc	150-1200	g/24 h	0.0153	2.3-18.3	mol/d	XX.X	0.1 mol/d

