

SI Units

RECOMMENDED UNITS FOR SOME BIOCHEMICAL AND HAEMATOLOGICAL TESTS

System*	Components	Molecular Weight or Atomic Weight	Approximate Normal Ranges or Typical Normal Values (in parentheses approximate ranges found in hospital practice)		Multiplication Factor for Exact Conversion from Present Commonly Used Units to SI Units
			Convention in Current Use	Recommended Convention	
P	Amino acid nitrogen	14.01	3.5-5.5 mg/100ml (3-30)	2.5-4.0 mmol/l (2-20)	0.714
U	Amino acid nitrogen	14.01	50-300 mg/24h (50-1000)	4-20 mmol/24h (4-70)	0.0714
U	δ-Aminolaevulate	131.1	0.1-6 mg/24h	0.8-46 μmol/24h	7.63
B	Ammonium nitrogen	14.01	40-80 μg/100ml (40-300)	24-48 μmol/l (24-180)	0.714
B	Ascorbate	176.1	0.8-1.4 mg/100ml (0.1-2.0)	45-80 μmol/l (6-120)	56.8
U	Ascorbate	176.1	20-50 mg/24h (5-100)	110-280 μmol/24h (28-570)	5.68
B	Base excess	—	± 2 m-equiv/l	± 2 mmol/l	No change
P	Bicarbonate	—	24-32 m-equiv/l	24-32 mmol/l	No change
P	Bilirubin (total)†	584.7	0.3-1.0 mg/100ml (0.3-30)	5-17 μmol/l (5-500)	17.1
S	Caeruloplasmin	—	30-60 mg/100ml (2-60)	300-600 mg/l (20-600)	10
P	Calcium (total)	40.08	8.5-10.5 mg/100ml (4-16)	2.1-2.6 mmol/l (1-4)	0.250
U	Calcium	40.08	100-300 mg/24h (10-500)	2.5-7.5 mmol/24h (0.2-12)	0.0250
B	Carbon dioxide (PCO ₂)	—	34-46 mmHg (10-100)	4.5-6.1 kPa (1.3-13)	0.133
P	β-Carotene	536.9	50-300 μg/100ml (20-500)	0.9-5.6 μmol/l (0.4-9)	0.0186
U	Catecholamines (as adrenalin)	183.2	10-100 μg/24h (10-1000)	0.05-0.55 μmol/24h (0.05-5.5)	0.00546
P	Chloride	—	95-105 m-equiv/l (100-800)	95-105 mmol/l (2.5-20)	No change
P	Cholesterol‡	386.7	140-300 mg/100ml (100-800)	3.6-7.8 mmol/l (2.5-20)	0.0259
P	Copper	63.54	80-150 μg/100ml (20-200)	13-24 μmol/l (3.0-30)	0.157
U	Copper	63.54	10-50 μg/24h (10-500)	0.2-0.8 μmol/24h (0.2-8.0)	0.0157
U	Coproporphyrins	655	100-200 μg/24h (100-1000)	0.15-0.31 μmol/24h (0.2-1.5)	0.00153
P	Cortisol	362.5	10-25 μg/100ml (5-50)	280-700 nmol/l (140-1400)	27.6
U	Creatine	131.1	0-50 mg/24h (0-250)	0-400 μmol/24h (0-2000)	7.63
P	Creatinine	113.1	0.7-1.4 mg/100ml (0.7-15)	60-120 μmol/l (60-1300)	88.4
U	Creatinine	113.1	1.0-2.0 g/24h (0.2-2)	9-17 mmol/24h (1.7-17)	8.84
F	Fat (as stearic acid)	284	3-5 g/24h (3-30)	11-18 mmol/24h (10-100)	3.52
P	Fibrinogen	—	150-400 mg/100ml (50-1000)	1.5-4.0 g/l (0.5-10.0)	0.01
S	Folate	—	3-20 ng/ml or μmg/ml (0.5-25)	3-20 μg/l (0.5-25)	No change
U	Formiminoglutamate	173.2	0-30 mg/24h (0-500)	0-170 μmol/24h (0-3000)	5.77
B	Glucose	180.2	55-90 mg/100ml (10-1000)	3.0-5.0 mmol/l (0.6-60)	0.0555
U	Glucose	180.2	0-0.2 g/100ml (0-3.0)	0-11 mmol/l (0-160)	55.5

* B = blood; CSF = cerebrospinal fluid; F = faeces; P = plasma; S = serum; U = urine.

† Conjugated bilirubin is expressed as bilirubin.

‡ Cholesterol esters are expressed as cholesterol.

** Normal ranges for the substances are not given as they depend on sex.

†† No unit is necessary but 1/l is implied.

TABLE (contd)

System*	Components	Molecular Weight or Atomic Weight	Approximate Normal Ranges or Typical Normal Values (in parentheses approximate ranges found in hospital practice)		Multiplication Factor for Exact Conversion from Present Commonly Used Units to SI Units
			Convention in Current Use	Recommended Convention	
B	Haemoglobin‡	—	14.4 g/100ml or g%	14.4 g/dl	No change
S	Haptoglobins (Hb binding)	—	30–200 mg/100ml	0.3–2.0 g/l	0.01
U	5-Hydroxyindole acetate (5 HIAA)	191.2	3–14 mg/24h (3–50)	15–75 µmol/24h (15–260)	5.23
U	4-Hydroxy 3-methoxy mandelate (HMMA)	198.2	2–7 mg/24h (2–40)	10–35 µmol/24h (10–200)	5.05
U	Hydroxyproline	131.1	10–35 mg/24h	0.08–0.25 mmol/24h	0.00763
S	Iron	55.85	70–180 µg/100ml (20–400)	13–32 µmol/l (3.6–70)	0.179
S	Total iron binding capacity (as iron)	55.85	250–400 µg/100ml (50–500)	45–70 µmol/l (9–90)	0.179
B	Ketones (as acetoacetate)	102.1	0.8–1.4 mg/100ml (0.8–10)	80–140 µmol/l (80–1000)	97.9
B	Lactate	90.08	3.6–13.0 mg/100ml (3–50)	0.4–1.4 mmol/l (0.3–5.5)	0.111
B	Lead	207.2	10–40 µg/100ml (10–200)	0.5–2.0 µmol/l (0.5–10)	0.0483
U	Lead	207.2	30–80 µg/24h (30–500)	0.14–0.40 µmol/24h (0.14–2.5)	0.00483
B	Leucocytes (total) (WBC)	—	4000–11 000/µl or 4.0–11.0 × 10 ⁹ /mm ³	4.0–11.0 × 10 ⁹ /l	10 ⁹
P	Lipids (total)	—	400–1000 mg/100ml (200–2000)	4.0–10.0 g/l (2.0–20)	0.01
P	Magnesium	24.31	1.8–2.4 mg/100ml (1.0–5.0)	0.7–1.0 mmol/l (0.4–2.0)	0.411
U	Magnesium	24.31	80–120 mg/24h (5–300)	3.3–5.0 mmol/24h (0.2–12)	0.0411
B	Mean cell haemoglobin (MCH)	—	27–32 pg or µg	27–32 pg	No change
B	Mean cell haemoglobin concentration (MCHC)	—	30–35%	30–35 g/dl	No change
B	Mean cell volume (MCV)	—	75–95 µ ³ or µm ³	75–95 fl	No change
F	Nitrogen	14.01	1–2 g/24h (1–5)	70–140 mmol/24h (70–360)	71.4
P	Non-protein nitrogen	14.01	20–30 mg/100ml (10–200)	14–21 mmol/l (7–140)	0.714
U	Oestriol	288.4	(2–50) mg/24h	(7–170) µmol/24h	3.47
P	Osmolality	—	275–295 mosmol/kg	275–295 mmol/kg	No change
U	Oxalate	90.04	20–40 mg/24h (20–150)	0.2–0.4 mmol/24h (0.2–1.7)	0.0111
B	Oxygen (PO ₂)	—	90–110 mmHg (20–400)	12–15 kPa (2.5–50)	0.133
U	17 Oxogenic steroids (as dehydro-epiandrosterone)	288.4	10–20 mg/24h (2–50)	35–70 µmol/24h (70–170)	3.47
U	17-Oxosteroids (as dehydro-epiandrosterone)	288.4	10–25 mg/24h (2–50)	35–85 µmol/24h (7.0–170)	3.47
B	Packed cell volume (PCV)‡,††	—	41%	0.41	0.01
B	Platelets	—	150 000–400 000/µl or/mm ³	150–400 × 10 ⁹ /l	10 ⁹
P	Phenylalanine	165.2	1.0–3.0 mg/100ml (1.0–50)	0.06–0.2 mmol/l (0.06–3.0)	0.0605
P	Phospholipid-phosphorus	30.97	5–10 mg/100ml (5–30)	1.6–3.2 mmol/l (1.6–10)	0.323

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P	Phosphate (as inorganic P)	30.97	2.5-4.5 mg/100ml (1.5-10)	0.8-1.4 mmol/l (0.5-3.2)	0.323
U	Phosphate (as inorganic P)	30.97	0.5-1.5 g/24h (0.2-2)	15-50 mmol/24h (6.5-65)	32.3
U	Porphobilinogen	226.2	0.2-2 mg/24h (0.2-20)	1-10 µmol/24h (1-100)	4.42
P	Potassium	—	3.8-5.0 m-equiv/l	3.8-5.0 mmol/l	No change
U	Pregnanediol	320.5	0-1 mg/24h (0-20)	0-3.1 µmol/24h (0-62)	3.12
U	Pregnanetriol	336.5	0.1-3 mg/24h (0.1-5)	0.3-9.0 µmol/24h (0.3-15)	2.97
S	Proteins Total	—	6.2-8.2 g/100ml (4-10)	62-82 g/l (40-100)	10.0
S	Albumin	—	3.6-5.2 g/100ml (1-5)	36-52 g/l (10-50)	10.0
S	Globulins	—	2.4-3.7 g/100ml (2-10)	24-37 g/l (20-100)	10.0
CSF	Proteins	—	10-40 mg/100ml (10-2000)	0.1-0.4 g/l (0.1-20)	0.01
S	Protein-bound iodine	126.9	4.0-7.5 µg/100ml (1-20)	300-600 nmol/l (80-1600)	78.8
B	Pyruvate	88.06	0.4-0.7 mg/100ml (0.4-3.0)	45-80 µmol/l (50-300)	113.5
B	Red cell count (RBC)‡	—	4.5 × 10 ⁹ /µl or /mm ³	4.5 × 10 ¹² /l	10 ⁶
B	Red cell diameter	—	6.7-7.7 µ or µm	6.7-7.7 µm	No change
B	Reticulocytes	—	0.2-2.0% or 10-100 × 10 ³ /µl	0.2-2.0% or 10-100 × 10 ⁹ /l	No change 10 ⁶
P	Sodium	—	136-148 m-equiv/l	136-148 mmol/l	No change
S	Thyroxine-iodine	126.9	3.1-5.9 µg/100ml (1-20)	240-450 nmol/l (80-1600)	78.8
S	Transferrin	—	120-200 mg/100ml (100-500)	1.2-2.0 g/l (1.0-5.0)	0.01
P	Triglyceride (as triolein)	885.5	25-150 mg/100ml (25-2000)	0.3-1.7 mmol/l (0.3-23)	0.0113
P	Urate	168.1	2-7 mg/100ml (2-12)	0.1-0.4 mmol/l (0.1-0.7)	0.0595
U	Urate	168.1	0.5-2.0 g/24h	3-12 mmol/24h	5.95
B	Urea	60.06	15-40 mg/100ml (15-500)	2.5-6.5 mmol/l (2.5-80)	0.166
U	Urea	60.06	1.5-3.0 g/100ml (0.2-4.0)	250-500 mmol/l (35-660)	166
F	Urobilinogen	596	30-300 mg/24h (30-1000)	50-500 µmol/24h (50-1700)	1.68
U	Uroporphyrins (I+III)	830	0-25 µg/24h (0-1000)	0-30 nmol/24h (0-1200)	1.20
P	Vitamin A	286.4	20-50 µg/100ml (20-500)	0.7-1.7 µmol/l (0.7-17.4)	0.0349
S	Vitamin B12 (as cyanocobalamin)	—	160-925 pg/ml or µg/ml	160-925 ng/l	No change

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