

References Density

v4.2 (04.06.2024)

References for the density of tissues listed in our material properties database. Tissues, which do not have available literature values in the database, are substituted with values from other similar tissues. In these cases, the tissue used is listed instead of a reference.

Table 1: References for the density of tissues

Tissue	Reference
Adrenal Gland	Testut 1889a Woodard and White 1986
Air	IT'IS Fluid Properties Database
Bile	Erdmann and Gos 1990
Blood	Erdmann and Gos 1990 Huang and Wu 1976 Poppendiek et al. 1967 Murihead, Grow, and Walker 1946
Blood Plasma	Hinghofer-Szalkay and Greenleaf 1985
Blood Serum	Wolf n.d.
Blood Vessel Wall	Erdmann and Gos 1990 Murihead, Grow, and Walker 1946
Bone (Cancellous)	Clauser, McConville, and Young 1969 Robinson 1958 Blanton and Biggs 1968
Bone (Cortical)	Clauser, McConville, and Young 1969 Henschel 1943 Robinson 1958 Blanton and Biggs 1968 Gong, Arnold, and Cohn 1964
Bone Marrow (Red)	Mechanik 1926 Woodard and White 1986
Bone Marrow (Yellow)	Mechanik 1926 Woodard and White 1986
Brain	Cooper and Trezek 1972 Poppendiek et al. 1967
Brain (Grey Matter)	Cooper and Trezek 1972
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Tissue	Reference
	Danilewsky 1863
Brain (White Matter)	Cooper and Trezek 1972 Huang and Wu 1976 Danilewsky 1863
Breast Fat	Fat
Breast Gland	Erdmann and Gos 1990 Woodard and White 1986
Bronchi	Blood Vessel Wall
Bronchi lumen	Air
Cartilage	Erdmann and Gos 1990 Davy 1829
Cerebellum	Brain
Cerebrospinal Fluid	Altman and Dittmer 1961
Cervix	Uterus
Commissura Anterior	Brain(White Matter)
Commissura Posterior	Brain(White Matter)
Connective Tissue	Fat and Tendon Ligament
Diaphragm	Muscle
Ductus Deferens	Blood Vessel Wall
Dura	Tendon and Ligament
Epididymis	Testis
Esophagus	Davy 1829
Esophagus Lumen	Air
Extracellular Fluids	Brownlow, Hutchins, and Johnston 1981 Duck 1990
Eye (Aqueous Humor)	Begui 1954 Duck 1990
Eye (Choroid)	Blood
Eye (Ciliary Body)	Muscle
Eye (Cornea)	Davy 1829 N/A
Eye (Iris)	Muscle
Eye (Lens)	Scammon and Hesdorffer 1937
Eye (Retina)	Stefansson et al. 1987
Eye (Sclera)	N/A
Eye (Vitreous Humor)	Huang and Wu 1976 Giacosa 1883
Eye (Vitreous Humor)	Huang and Wu 1976 Giacosa 1883
Eye Lens (Cortex)	Eye (Lens)
Eye Lens (Nucleus)	Eye (Lens)
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Tissue	Reference
Fat	Åkerström et al. 1979 Clauser, McConville, and Young 1969 Erdmann and Gos 1990 Poppendiek et al. 1967 Morse and Soeldner 1964
Fat (Average Infiltrated)	Fat
Fat (Not Infiltrated)	Fat
Gallbladder	Erdmann and Gos 1990 <i>Documenta Geigy, Scientific Tables</i> 1959
Heart Lumen	Blood
Heart Muscle	Cooper and Trezek 1972 Erdmann and Gos 1990 Huang and Wu 1976 Duck 1990 Masugata et al. 1999
Hippocampus	Brain (Grey Matter)
Hypophysis	Testut 1893
Hypothalamus	Brain (Grey Matter)
Intervertebral Disc	Cartilage
Kidney	Cooper and Trezek 1972 Erdmann and Gos 1990 Poppendiek et al. 1967 Testut 1889b
Kidney (Cortex)	Vierordt 1906
Kidney (Medulla)	Vierordt 1906
Large Intestine	Erdmann and Gos 1990 Vierordt 1906
Large Intestine Lumen	Muscle and Water
Larynx	Cartilage
Liver	Cooper and Trezek 1972 Erdmann and Gos 1990 Poppendiek et al. 1967 Woodard and White 1986
Lung	Erdmann and Gos 1990 Huang and Wu 1976 Poppendiek et al. 1967 Guenard et al. 1992
Lung (Deflated)	Vierordt 1906
Lung (Inflated)	Lung
Lymph	N/A
Lymphnode	Duck 1990
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Tissue	Reference
Mandible	Bone (Cortical)
Medulla Oblongata	Brain
Meniscus	Cartilage
Midbrain	Brain
Mucous Membrane	N/A
Muscle	Clauser, McConville, and Young 1969 Erdmann and Gos 1990 Huang and Wu 1976 Vierordt 1906
Nerve	Duck 1990
Ovary	Krause and Fisher 1879
Pancreas	Erdmann and Gos 1990 Testut 1889b
Penis	Blood Vessel Wall
Pharynx	Air
Pineal Body	Hypophysis
Placenta	Chung and Partk 1974 Younoszai and Haworth 1969
Pons	Brain
Prostate	Testut 1889b
Salivary Gland	Prostate
SAT (Subcutaneous Fat)	Fat
Scalp	Skin
Seminal vesicle	Prostate
Skin	Clauser, McConville, and Young 1969 Erdmann and Gos 1990 Leider and Buncke 1954
Skull	Bone
Skull Cancellous	Bone (Cancellous)
Skull Cortical	Bone (Cortical)
Small Intestine	Woodard and White 1986
Small Intestine Lumen	Muscle and Water
Spinal Cord	Nerve
Spleen	Cooper and Trezek 1972 Erdmann and Gos 1990 Testut 1889b
Stomach	Davy 1829 Erdmann and Gos 1990
Stomach Lumen	Muscle and Water
Tendon and Ligament	Erdmann and Gos 1990 ICRP 1975
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Tissue	Reference
Testis	Erdmann and Gos 1990 Krause and Fisher 1879
Thalamus	Brain (Grey Matter)
Thymus	N/A
Thyroid Gland	Woodard and White 1986 Krause and Fisher 1879
Tongue	Muscle
Tooth	Brown, Dewey, and Jacobs 1970 Davy 1829
Tooth (Dentine)	Boyd, Drain, and Deakins 1938 Brown, Dewey, and Jacobs 1970 Henschel 1943 Manly, Hodge, and Ange 1939 Thewlis 1932 Erdmann and Gos 1990
Tooth (Enamel)	Manly, Hodge, and Ange 1939 Thewlis 1932 Weidmann, Weatherell, and Hamm 1967
Trachea	Vierordt 1906
Trachea Lumen	Air
Ureter Urethra	Blood Vessel Wall
Urinary Bladder Wall	Erdmann and Gos 1990 Woodard and White 1986
Urine	Erdmann and Gos 1990 Erdmann and Gos 1990
Uterus	Erdmann and Gos 1990 Testut 1889b
Vagina	Large Intestine
Vertebrae	Bone (Cortical)
Water	Kell 1975

N/A: A value exists in the database but its reference is no longer traceable, **None:** The property is not existent for the tissue in question, **Not in Database:** Values for that property are not yet included in the material properties database.

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