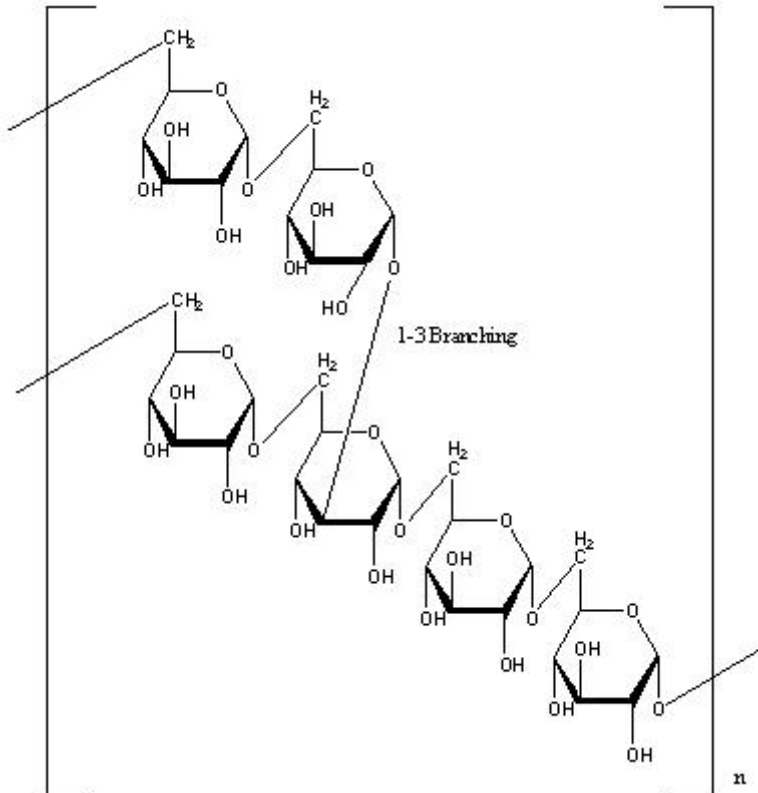


TECHNICAL INFORMATION

Catalog Number: 101505, 101507, 101508, 101509, 101513, 101514, 101519, 195602

Dextran

Structure:



Molecular Formula: $(C_6H_{12}O_6)_n$

CAS #: 9004-54-0

Physical Description: White to slightly off white powder

Solubility: Soluble in water (> 30 mg/ml), except for dextrans in the molecular weight range of 5 to 40 million (catalog number 101509); freely soluble in DMSO, formamide, ethylene glycol and glycerol. Neutral aqueous dextran solutions can be sterilized by autoclaving at 110-115°C for 30 to 45 minutes. Dextran can be hydrolyzed by strong acids at high temperatures. The terminal reducing end group of dextran can be oxidized in alkaline solutions.

Description: Dextran is a high molecular weight polymer of anhydroglucose. It is composed of approximately 95% alpha-D-(1-->6) linkages. The remaining alpha(1-->3) linkages account for the branching of dextran.^{8,23,25} Conflicting data on the branch lengths implies that the average branch length is less than three glucose units.^{19,20} However, other methods indicate branches of greater than 50 glucose units exist.^{5,24} Native dextran has been found to have a molecular weight in the range of 9 million to 500 million.^{3,4,9} Lower molecular weight dextrans will exhibit slightly less branching²⁰ and have a more narrow range of molecular weight distribution. Dextrans with molecular weights greater than 10,000 behave as if they are highly branched. As the molecular weight increases, dextran molecules attain greater symmetry.^{12,24,26} Dextrans with a molecular weight of 2,000 to 10,000 dextran molecules exhibit the properties of an expandable coil.¹² At molecular weights below 2,000, dextran is more rod-like.¹⁰ The molecular weight of dextran is measured by one or more of the following methods: low angle laser light scattering², size exclusion chromatography¹³, copper-complexation²⁷, and anthrone reagent⁴ colorimetric reducing-end sugar determination and/or viscosity.¹² During preparation, fractionation can be accomplished by size exclusion chromatography¹³ or ethanol fractionation in which the largest molecular weight dextrans precipitate first.¹⁷

Dextran solutions have been used as plasma extenders.^{1,28} Solutions of 10% dextran (MW ~40,000) exert a slightly higher colloidal osmotic pressure than plasma proteins. A 10% Dextran (MW ~40,000) solution in 0.9% sodium chloride or 5% glucose has reported to be used as a short-term plasma extender for post-operative thrombo-embolic disorders. After infusion, approximately 70% dextran (MW ~40,000) is excreted in the urine unchanged after 24 hours. A small amount is eliminated in the feces. The remaining dextran is slowly metabolized to glucose. A 6% dextran (MW ~70,000) solution exerts a colloidal

osmotic pressure similar to that of plasma proteins. Dextran with molecular weights greater than 50,000 tend to slowly diffuse across the capillary wall and are slowly metabolized to glucose. Approximately 50% of infused dextran (MW ~70,000) is excreted unchanged in the urine in 24 hours.²⁸

Colloidal solutions containing dextran (MW ~250,000) have been used to isolate aggregated platelets²¹, leukocytes⁶ and lymphocytes¹⁴ in blood by centrifugation. Dextran (MW ~40,000) has been used for the isolation of intact nuclei.¹⁶ Dextran can be used to enhance the precipitation and sensitivity of antibody-antigen complexes in immuno-diffusion applications. Dextran (MW ~80,000) was infused into an immunoelectrophoresis gel at a maximum of 80 mg/ml.¹⁵ Dextran (MW ~250,000 to 2 million) have also been used in similar applications.⁷

At lower concentrations, dextrans (MW ~10,000 to 40,000) have been used to inhibit platelet aggregation.¹¹

Dextran (MW ~400,000 to 500,000) can be used as long and hydrophilic spacer arms to improve the performance of immobilized proteins acting on macromolecules.²²

Availability:

Catalog Number	Description	Size
195602	Dextran, Molecular Weight approximately 5,000 to 10,000	500 g
101507	Dextran, Molecular Weight approximately 15,000 to 20,000	50 g 100 g 500 g 1 kg
101508	Dextran, Molecular Weight approximately 35,000 to 50,000	10 g 50 g 100 g 500 g 1 kg
101505	Dextran, Molecular Weight approximately 40,000 ± 3,000	10 g 50 g 100 g
101509	Dextran, Molecular Weight approximately 5 to 40 million	100 g 500 g 1 kg
101513	Dextran, Molecular Weight approximately 60,000 to 90,000, pyrogen free, clinical grade	10 g 50 g 100 g 500 g 1 kg
101514	Dextran, Molecular Weight approximately 200,000 to 300,000, pyrogen free	50 g 100 g 500 g 1 kg
101519	Dextran, Molecular Weight approximately 80,000, pyrogen free. For injection, 6% dextran in an isotonic solution.	500 ml

References:

- Merck Index, **12th Ed.**, No. 2989.
- Allen, P.W., *Techniques of Polymer Characterization*, Butterworths Scientific Publications, p. 131 (1959).
- Antonini, E., et al., *Biopolymers*, **v. 2**, 27 (1964).
- Arond, L.H. and Frank, H.P., *J. Phys. Chem.*, **v. 58**, 953 (1954).
- Bovey, F.A., *J. Polym. Sci.*, **v. 35**, 167 (1959).
- Boyum, A., *Scan. J. Clin. Lab. Invest.*, **v. 21, Suppl. 97**, 31 (1968).
- Ceska, M., *Biochem. J.*, **v. 111**, 607 (1969).
- Dimler, R.J., et al., *J. Am. Chem. Soc.*, **v. 77**, 6568 (1955).
- Elias, H.G., *Makromol. Chem.*, **v. 33**, 166 (1959).
- Gekko, K., *Am. Chem. Soc. Symposium Series*, **v. 150**, 415 (1981).
- Gelin, L.E. and Ingelman, B., *Acta Chir. Scand.*, **v. 122**, 294 (1961).
- Granath, K.A., *J. Colloid Sci.*, **v. 13**, 308 (1958).
- Granath, K.A. and Flodin, P., *Makromol. Chem.*, **v. 48**, 160 (1961).
- Harris, R. and Ukaejiofo, E.O., *Brit. J. Haematol.*, **v. 18**, 229 (1970).
- Hellsing, K., *Biochem. J.*, **v. 114**, 141 (1969).
- Honda, S.I., et al., *J. Exp. Botany*, **v. 17**, 460 (1966).
- Ingelman, B. and Halling, M.S., *Ark. Kemi.*, **v. 1**, 61 (1949).
- Jermy, M.A., *Anal. Biochem.*, **v. 68**, 332 (1975).
- Larm, O., et al., *Carbohydr. Res.*, **v. 20**, 39 (1971).
- Lindberg, B. and Svensson, S., *Acta Chem. Scand.*, **v. 22**, 1907 (1968).
- Minor, A.H. and Burnett, L., *N.Y. State J. Med.*, **v. 53**, 547 (1953).
- Penzol, G., et al., *Biotechnol. Bioeng.*, **v. 60**, 518-523 (1998).
- Rankin, J.C. and Jeanes, A., *J. Am. Chem. Soc.*, **v. 76**, 4435 (1954).
- Senti, R.F., et al., *J. Polym. Sci.*, **v. 17**, 527 (1955).
- VanCleve, J.W., et al., *J. Am. Chem. Soc.*, **v. 78**, 4435 (1956).
- Wales, M., et al., *J. Polym. Sci.*, **v. 66**, 101 (1979).
- *Journal of Research of the National Bureau of Standards*, **v. 50**, 81 (1953).
- *Martindale: The Extra Pharmacopoeia*, Reynolds, J.E.F. (ed.), pp. 650-651 (1993).