

Product Information

31403 / 31395 / 31404 / 31396 Dextran sulfate Sodium salt from *Leuconostoc* ssp.

CAS number: 9011-18-1

Product Description:

Structure: Dextran sulfates are supplied as the sodium salt forms, making them soluble and stable in water. Dextran sulfate contains approximately 17% sulfur which is equivalent to approximately 2.3 sulfate groups per glucosyl residue. Dextran is a polymer of anhydroglucose. It is composed of approximately 95% alpha-D-(166) linkages. The remaining (163) linkages account for the branching of dextran.^{1,2,3} Conflicting data on the branch lengths implies that the average branch length is less than three glucose units.^{4,5} However, other methods indicate branches of greater than 50 glucose units exist.^{6,7} Lower molecular weight (MW) dextrans will exhibit slightly less branching⁴ and have a more narrow range of MW distribution.⁸ In low ionic strength solutions the dextran sulfate polymer will be fully extended due to repulsion of the negatively charged sulfate groups.⁹ In high ionic strength solutions the polymer shrinks and more closely resembles unionized dextran.⁹ pH changes over the titrable range of the sulfate group will cause expansion and contraction.⁹ The MW of dextran sulfate is measured by one or more of the following methods: low angle laser light scattering¹⁰, size exclusion chromatography¹¹, and viscosity¹².

Sigma-Aldrich dextrans are derived from *Leuconostoc mesenteroides*. Various MW are produced by limited hydrolysis and fractionation. Esterification with sulfuric acid is carried out under mild conditions. Fractionation of dextran can be accomplished by size exclusion chromatography¹¹ or ethanol fractionation in which the largest MW dextrans precipitate first.¹⁷

Stability / Storage as supplied:

If stored properly at room temperature dextran sulfate powders should be stable for a few years.

Solubility / Solution Stability:

Sigma-Aldrich tests the solubility of dextran sulfates (Sigma-Aldrich 31403) at 50 mg/ml in water. Clear solutions are obtained. Buffered aqueous dextran sulfate solutions can be sterilized by autoclaving at 110-115°C for 30 to 45 minutes.⁸

Dextran can be hydrolyzed by strong acids at high temperatures. Dextran sulfate has a higher affinity for calcium ions than for sodium ions. The calcium salt of dextran sulfate is insoluble.⁸

The free acid (hydrogen) form of dextran sulfate is extremely acidic and autohydrolyzes rapidly in solution and as a powder.⁸

Applications:

Lipoprotein Separation:

Dextran sulfate is routinely used to selectively precipitate lipoproteins. In the presence of 0.05% dextran sulfate (MW 15,000) and 0.05M MnCl₂, VLDL and LDL precipitate. Increasing the final concentrations to 0.65% dextran sulfate and 0.2M MnCl₂ results in subsequent precipitation of HDL.¹⁴ Dextran sulfate (MW 500,000) has been used similarly in the determination of HDL cholesterol.¹⁵

See also Sigma Diagnostic Procedure # 352-3.

Hybridization:

The inclusion of dextran sulfate at a final concentration of 10% has been shown to accelerate the hybridization of labeled probes with membrane-immobilized DNA.¹⁶ Sigma-Aldrich offers dextran sulfate MW 500,000 molecular biology grade (Sigma-Aldrich31403) for this application.

Other Nucleic Acid Related Applications:

Dextran sulfate has been shown to release DNA from DNA-histone complexes.¹⁷ Dextran sulfate inhibits the binding of RNA to ribosomes.^{18,19} It is also a potent ribonuclease inhibitor²⁰ and has been used in the isolation of ribosomes.²¹

Miscellaneous Applications:

Dextran sulfate has been used with polyethylene glycol in aqueous biphasic polymer separations for bacteria, virus, proteins, and nucleic acids.²² The effects on cell proliferation have been studied.²³ It has been shown to form insoluble complexes with fibrinogen.²⁴ Dextran sulfate has been found to bind to virus and inhibit initial adsorption to susceptible cells.²⁵

References:

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Precautions and Disclaimer:

This product is for R&D use only, not for drug, household, or other uses. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.