31395 / 31404 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 branching [4] 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 scattering [10], size exclusion chromatography [11], and viscosity [12].

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 chromatography [11] 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.

Soubility / 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 $MnCl_2$, VLDL and LDL precipitate. Increasing the final concentrations to 0.65% dextran sulfate and 0.2M $MnCl_2$ 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 inhibitor [20] 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.