Phenyl-dextran

Chemical name: 1-phenoxy-2-hydroxy-propyl-dextran

Trade name: Phenyl-dextran

CAS nr: N/A

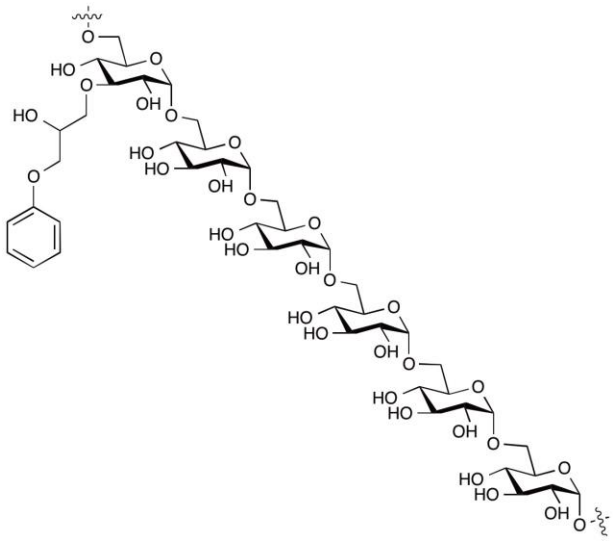

Fig. 1. Structural representation of phenyl-dextran

Synthesis and structure

Phenyl-dextrans are synthesized from selected controlled dextran fractions, derived from *Leuconostoc mesenteroides* B512F, by reacting with an appropriate epoxide. After purification, the products are controlled for solubility, mean molecular weight Mw, degree of substitution, and loss on drying. A specification may be obtained on request.

The products are designated by the approximate molecular weights of the dextran fractions used. Thus, for example, the product PhDex40 has a molecular weight of approx. 40000. The dextran fractions used have weight average molecular weights (Mw) from 4000 to 2000000 and are carefully controlled by GPC (gel permeation chromatography) optical rotation and loss on drying.

The actual molecular weight is determined by GPC. This value is supplied with the Certificate of Analysis. The dextran used is from Leuconostoc mesenteroides B-512F which is essentially a linear α-(1-6)-linked glucose chain with however a low percentage (2-5%) of α-(1-3) branches distributed along the chain.

Physical properties

Phenyl-dextrans are white, odourless powders which are readily soluble in water or electrolyte solutions. The product has a pronounced hydrophobic character by virtue of the phenyl groups attached. Since phenyl-dextrans may coat hydrophobic surfaces, it was decided to run the GPC

determination of Mw in water on a dedicated Superose column, in order to minimize the risks for interaction with component in the GPC system. The values obtained are nevertheless lower than the starting dextran fraction – and this is attributed to some interaction in the gel or plastic components. Phenyl-dextrans are insoluble in most organic solvents, for example, ethanol, methanol, acetone, chloroform, ethyl acetate etc.

The purity is controlled by determination of weight average molecular weight Mw, specific optical rotation, phenyl content and Loss on drying. Tests are performed in production for free phenyl contaminants. The phenyl content as determined by the absorbance at 269nm ranges from 0.34 to 0.4 (value as degree of substitution i.e. number of substituents per glucose molecule). The phenyl content expressed as w/w is around 22%.

The phenyl peak has an absorbance maximum at 269nm. (see Fig.2).

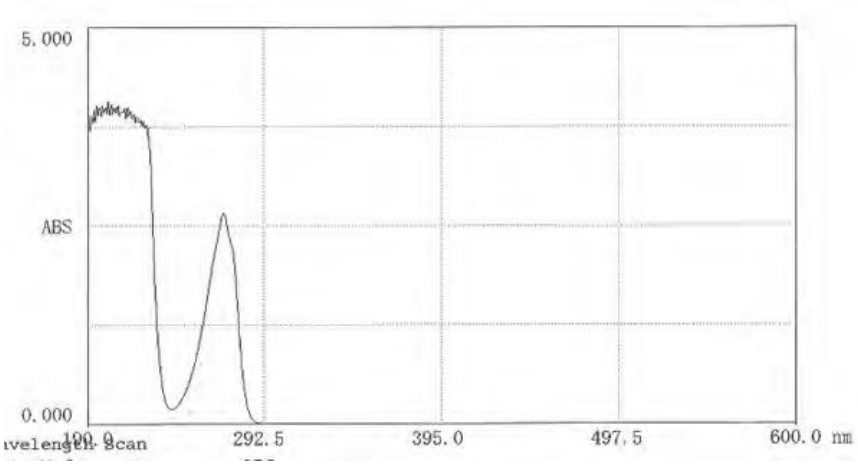

Fig .2. UV-Spectrum of Phenyl-dextran in water

Stability

The phenyl substituent is bound to the dextran by ether linkages which confer excellent stability to the substituents in both acid and alkaline conditions. Providing the product is stored in air-tight containers in the dark, it will be stable for at least 5 years at ambient temperatures. Dextran itself had been studied in many prospective stability tests and has a shelf life of at least 5 years.

Applications

A number of applications of phenyl-dextran have appeared in patents. The essential property of phenyl-dextran is its potential for coating plastic and related surfaces to impart a more hydrophilic character. This property has proved of value in many diagnostic devices.

References

1. Amersham Pharm.Biotech.; WO 0071245 A1, 2000
2. Becton Dickinson; EP 1750130 A1, 2007
3. Gyros Patent; EP 2261663 A2, 2010
4. Amersham BioSciences, EP 1200186 A1, 2000
5. Gyros, US 6322682 B1, 2001