



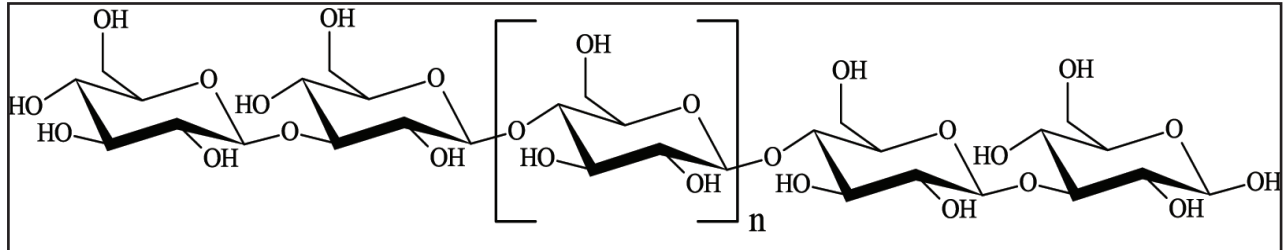
BARLEY BETA-GLUCAN (Low Viscosity) (Lot 100401)

P-BGBL

11/12

CAS NO. 9041-22-9

STRUCTURE



Schematic representation of barley β -D-Glucan subunit ($n = 2$ or 3 ; $\sim 90\%$ of glucan structure).

PROPERTIES

Purity:	$\sim 95\%$ (dw basis). Also contains 2% arabinose and 0.2% xylose.
Viscosity:	11 cSt (1% w/v; Ostwald C-type viscometer, 30°C)
Molecular Weight:	179 Kd (MAALS)
Sugar Composition:	Glucose, 97%; (glc of alditol acetates)
Starch:	0.3%
Arabinoxylan:	0.2% (enzymic method)
Protein:	0.1%
Moisture:	4.5%
Ash:	0.04%
Physical Description:	White, odourless powder

STORAGE CONDITIONS

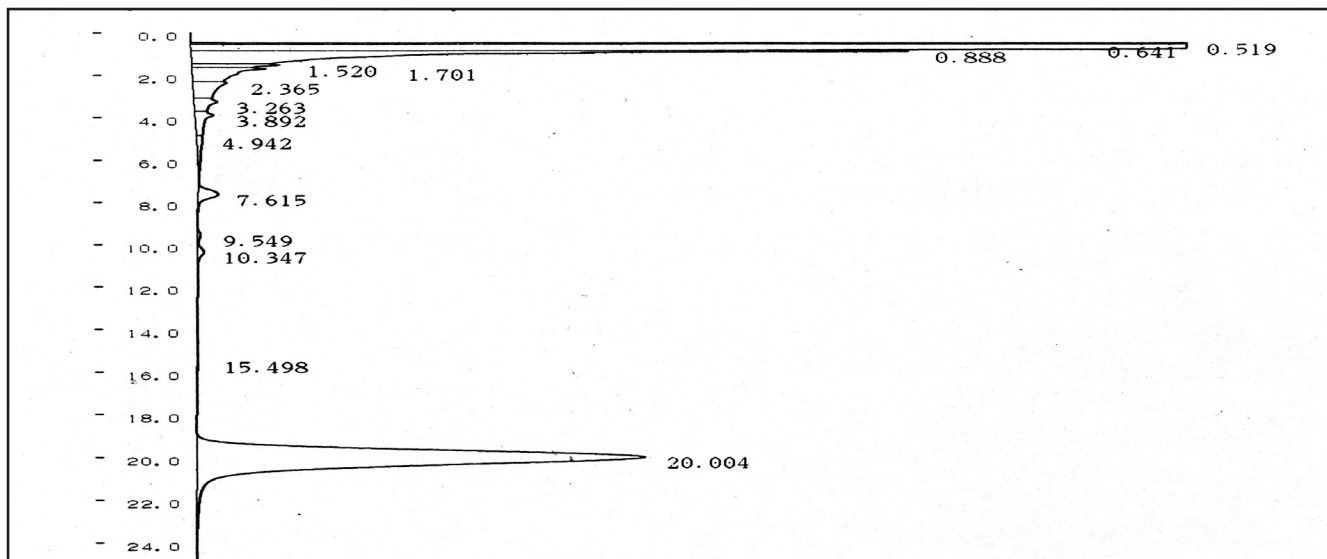
Store dry at room temperature in a well sealed container. Under these conditions, the product is stable for several years.

METHOD OF DISSOLUTION (for 1.0% w/v solution)

Accurately weigh 1.0 g of β -glucan into a 120 mL dry pyrex beaker. Add 5 mL of 95% ethanol to wet the sample. Add a magnetic stirrer bar followed by 90 mL of distilled water while stirring the slurry on a hot-plate magnetic stirrer. Adjust the heat setting to 120°C and stir vigorously. Cover the beaker loosely with aluminium foil and continue stirring vigorously. Turn the heat off when the solution begins to boil, but continue stirring the solution until the β -glucan completely dissolves (approx. 10 min). Adjust the volume of the solution to 100 mL (this solution may be very slightly turbid due to the presence of trace amounts of protein).

β -Glucan solutions can be stored at room temperature for several weeks in a well sealed storage bottle. Prevent microbial contamination by adding a few drops of toluene to the storage bottle. If the β -glucan begins to self-associate and precipitate from solution or gel, then loosen the bottle cap and heat the solution to 90-95°C in a boiling water bath for a few minutes. Tighten the cap and shake the contents vigorously. Add a few drops of toluene.

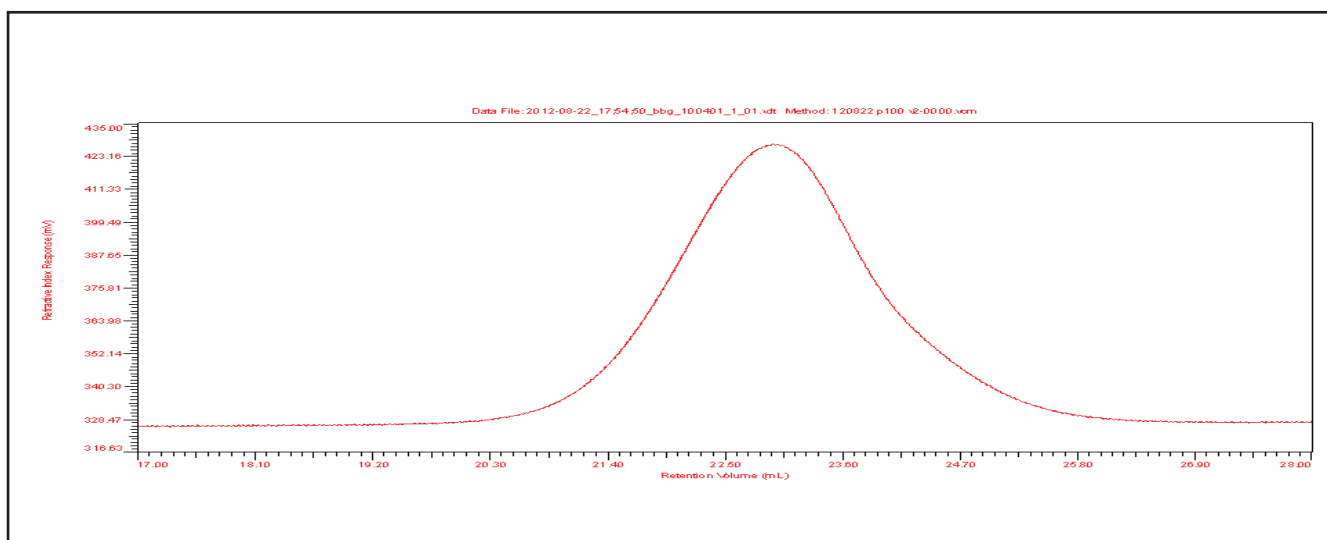
Gas liquid chromatography of the alditol acetates derived from hydrolysis and derivatisation of Barley β -Glucan (Lot 100401)



GLC:

A typical polysaccharide sample (~ 10 mg) was hydrolysed using 2N TFA at 120°C for 60 min. Subsequent sodium borohydride reduction was performed in 1N NH₄OH for 90 minutes at 40°C. The corresponding alditol acetates were prepared using acetic anhydride and 1-methyl imidazole, extracted into DCM and analysed by GC. Chromatography was performed on a Shimadzu GC-14B with CHROMATOPACK C-R8A using a Packed glass column (6ft x 5mm OD, 3mm ID) with 3% Silar 10C on W-HP (80-100 mesh). The carrier gas was nitrogen at 130 KPa. Injector temperature; 250°C; Column temperature; 230°C. Detection by FID with 60KPa H₂ pressure and 50 KPa air pressure.

Size Exclusion Chromatography of Barley β -Glucan (lot 100401)



Polysaccharide & Lot Number	Mp	Mw	Mn	(η)	Rg	Pd
Barley β -Glucan Lot 100401	128000	179000	97000	2.55	39.9	1.84
sd	7100	8400	3400	0.02	11.8	0.04

VISCOTEK ANALYSIS

Polysaccharide Solubilisation Protocol

A few mg (2-6) of each sample was weighed into a glass test tube in triplicate. Sufficient 0.1 M sodium nitrate containing 5 mM sodium azide (SEC eluent) was added to a concentration of ~ 1 mg/mL. Samples were stirred 2.5 hours at 90°C which was adequate to dissolve the polysaccharides. After cooling to room temperature, samples were filtered through a 0.45 µm filter into auto-sampler vials.

Size Exclusion Chromatography

The chromatographic system was a Shimadzu SCL-10Avp control unit (Shimadzu Scientific Instruments, Inc., Columbia, MD) using two PAA-M mixed bed columns and 1 PAA-203 column, plus a guard (PolyAnalytik, London, ON, Cd.) maintained at 40°C and run at a flow rate of 0.6 mL/min with an eluent of 100 mM NaNO₃ containing 5 mM NaN₃. All measurements were made from data collected using a model 305 Triple Detector Array from Viscotek (Viscotek, Houston, TX), which consisted of a refractive index detector (RI), a differential pressure detector (DP), a right angle laser light scattering detector (RALS) and a low angle laser light scattering detector (LALS). Values were calculated using OmniSEC 4.6 software (Viscotek, Houston, TX). A refractive index increment of 0.146 mL/g was used for the calculations. Pullulan standards were used to calibrate the method. For each run, two standards were used. The p100 standard was used to calibrate method, while the p800 was treated as a sample in order to confirm the accuracy of the method. Both standards were from Fluka and were prepared in eluent.

Results

The results of the analyses are provided in the table below. The average of three determinations is reported with the standard deviation (sd).

The parameters measured are:

M_p – peak molecular weight (g/mol)	– the molecular weight of the most abundant species in the sample.
M_w – weight average molecular weight	– the average molecular weight of the distribution based on the weight of particles in each fraction.
M_n – number average molecular weight	– the average molecular weight of the distribution based on number of particles in each fraction.
[η] – intrinsic viscosity (dL/g)	– the contribution of solute molecules to solution viscosity.
R_g – radius of gyration (nm)	– the root mean square distance of the monomers from the centre of the molecule.
Pd – Polydispersity Index	– the ratio of M _w /M _n which is generally used as an indicator of the width of the distribution, with 1.0 representing monodisperse molecules.