

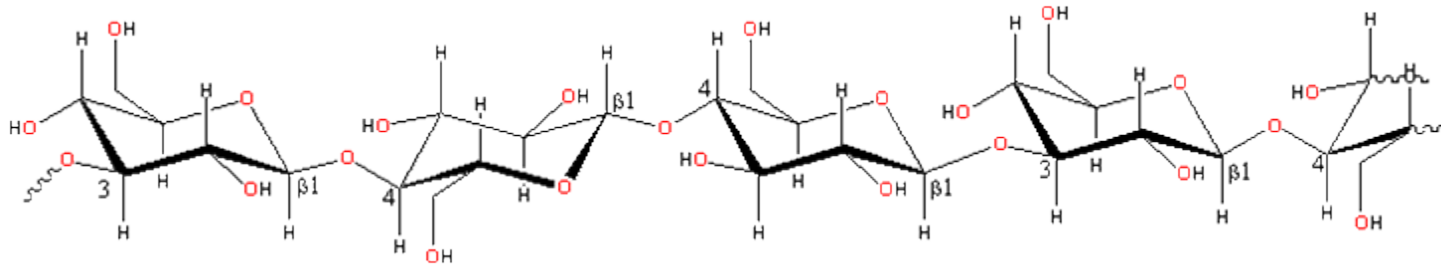
# $\beta$ -Glucan

- ▼ Source
- ▼ Structural unit
- ▼ Molecular structure
- ▼ Functionality

## Source

$\beta$ -Glucans occur in the bran of grasses (*Gramineae*) such as barley, oats, rye and wheat, generally in amounts of about 7%, 5%, 2% and less than 1% respectively..

## Structural unit



$\beta$ -Glucans consist of linear unbranched polysaccharides of linked  $\beta$ -(1  $\rightarrow$ 3)- and  $\beta$ -(1  $\rightarrow$ 4)-D-glucopyranose units in a non-repeating but non-random order. [[Back to Top](#) ▲]

## Molecular structure

$\beta$ -Glucans form 'worm'-like cylindrical molecules containing up to about 250,000 glucose residues that may produce cross-links between regular areas containing consecutive cellotriose units. They aggregate in solution [1681] to form thermoreversible infinite network gels. 90% of the  $\beta$ -(1  $\rightarrow$ 4)-links are in cellotriosyl and cellotetraosyl units joined by single  $\beta$ -(1  $\rightarrow$ 3)-links with no single  $\beta$ -(1  $\rightarrow$ 4)- or double  $\beta$ -(1  $\rightarrow$ 3)-links [234]. The ratio of cellotriosyl/cellotetraosyl is about 2.0-2.4 in oats, about 3.0 in barley and about 3.5 in wheat. A recent intervarietal study of glucans from barley and oats has been completed [787]. [[Back to Top](#) ▲]

## Functionality

The main use of  $\beta$ -glucans is in texturizing as fat substitutes. They are recognized as having important positive **health benefits** centered around their benefits in coronary heart disease, cholesterol lowering and reducing the glycemc response. Such health benefits are linked to its high viscosity although it may be that some of these effects are due to appetite suppression. High molecular weight  $\beta$ -glucans are viscous due to labile cooperative associations whereas lower molecular weight  $\beta$ -glucans can form soft gels as the chains are easier to rearrange to maximize linkages. Barley  $\beta$ -glucan is highly viscous and **pseudoplastic**, both properties decreasing with increasing temperature [748]. These properties cause difficulty in the brewing industry, negatively affecting fermentation and filtration.

Note that the related hydrocolloid **curdlan** has only  $\beta$ -(1 $\rightarrow$ 3)-D-glucopyranose units which form thermoreversible triple helical structures on heating and become irreversibly linked as the concentration or temperature increases.

Interactive structures are available (**Jmol**).

Source : <http://www1.lsbu.ac.uk/water/hygly.html>