

Carbohydrate Technology

Carbohydrates are one of the most abundant classes of products produced in nature. They appear in many forms and typical examples are cellulose and starch in plants, chitin in arthropods, and glycogen in animals. Carbohydrates consist of monomer units and are classified according to the number of monomers. There are monosaccharides such as glucose, oligomers which contain to about 20 units and polysaccharides. The function of these carbohydrates in nature is many fold, namely they support structure (cellulose in trees), protection (chitin) or as energy source (starch, glucose, sucrose and glycogen). Carbohydrates are used in a wide variety of products such as in food products for energy and texture and paper. In TNO Carbohydrate Technology is active in research and development on carbohydrates for food and non-food applications and these activities are clustered in four main activities.

The four main activities are:

- 1) **Structure/function relationships.** This activity has its focus on linking a typical structure of a polymeric carbohydrate to a certain functionality such as gelling, pasting, functional food fiber, just to name a few. Typical projects in this area aim at the development of new non-starch food fibers with high molecular weight and low viscosity.
- 2) **Modification of carbohydrates.** Modification can be done using organic chemistry, with the aid of enzymes, or by physical methods. The latter include thermal processing, treatment under pressure and superheated steam processing (water activity controlled)). The organic chemical route is predominantly for non-food purposes while, enzyme and physical induced modifications are preferred for food applications. Also this activity includes a new technology on release on command delivery systems developed at TNO and nicknamed BioSwitch.
- 3) **Development of healthy food ingredients.** This activity interacts with modification but also has a focus on the development of new structures focusing on food fibers. Physical treatment combined with isolation techniques are frequently combined.
- 4) **Side stream valorization.** The activity has a focus on organic side streams from e.g. the agricultural sector. The final goal is to unravel the stream and identify valuable ingredients which could have food or non-food applications.

