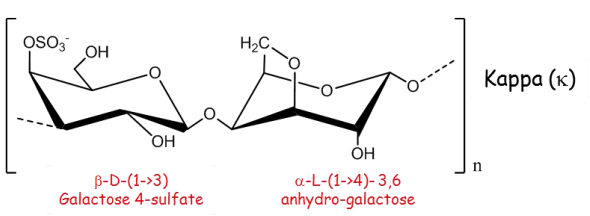
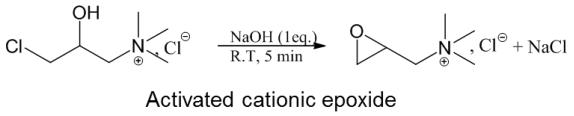
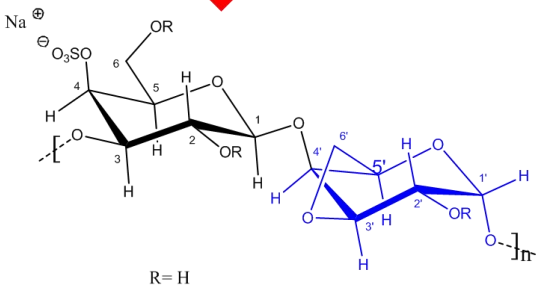


Anionic polysaccharide

Algae



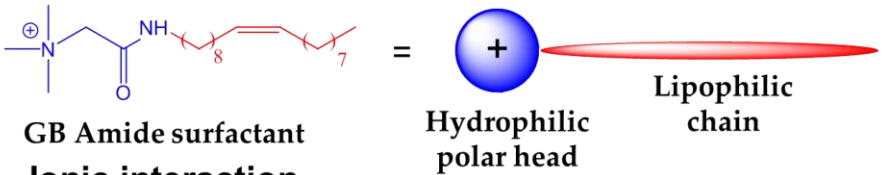
Activated cationic epoxide



R= H

R = CH_2-CH(OH)-CH_2-$N(CH_3)^+$,Cl^-

Chemical modification of anionic polysaccharides using cationic agents by covalent linkage

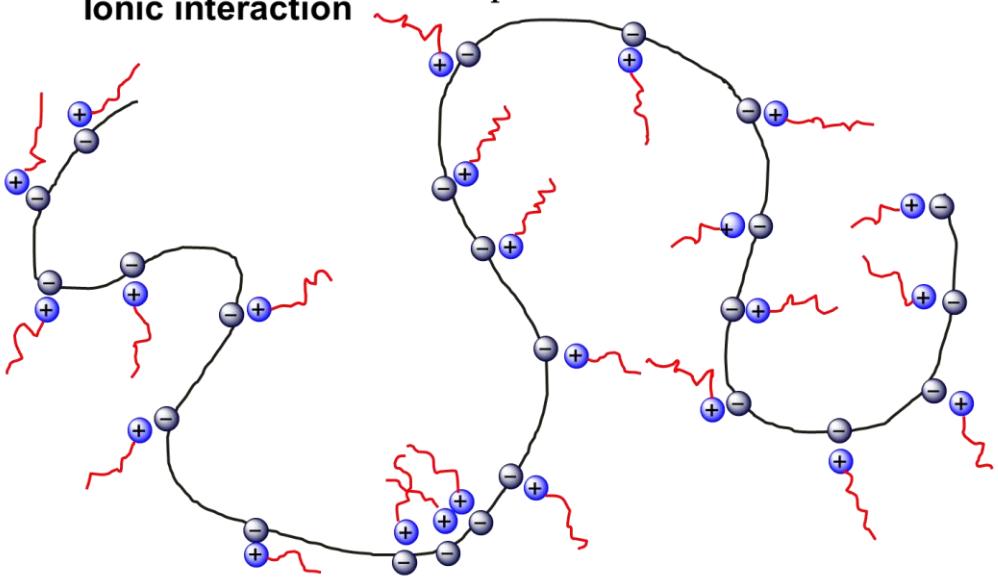


GB Amide surfactant

Hydrophilic polar head

Lipophilic chain

Ionic interaction



Nowadays, the development of biodegradable and biocompatible natural polymers based on natural renewable resources, especially to replace petrochemical products, is a concept that is gaining recognition for many applications: for instance in effluent treatment, pharmaceutical, detergents and cosmetics1. The challenge is chiefly to obtain final products that are both environmentally-friendly, milder and more efficient. Within this context, the use of renewable low-cost biomass as seaweeds which are distributed along worldwide coast is an alternative to explore and to design through green processes molecular structures that show improved performance, favourable ecotoxicological properties and reduced environmental impact. Indeed, algal marine biomass represents a rich source of complex polysaccharides and oligosaccharides with innovative structures and functional physical and biological properties that may lead to new materials with improved functional properties as antimicrobial activities (case of cationic polyelectrolytes) or blue surfactants and cosmetics actives (case of hydrophobically modified polysaccharides). Within the framework of IDEALG project, the ENSCR and the CEVA in Brittany set an objective to develop original chemically modified polysaccharides based on alginates (cell-wall polyuronic acids from brown seaweeds) or ulvans2 (sulfated rhamnouronans from the cell-wall of green seaweeds) and fatty hydrocarbon chains derived from vegetable resources3 or carrageenans (anionic sulphated galactans from cell-wall of red seaweeds). So, the project is to increase the value of new molecules based on seaweeds in order to respond to the growing market of natural products and to insure a sustainable development. Chemical modifications of these anionic polysaccharides have been studied either in aqueous media or using solvent free process in order to obtain respectively cationic or zwitterionic polysaccharides linked either by ether bonds or ionic interactions4 and amphiphilic polysaccharides linked by ester bonds.

1. Oligomannuronates from seaweeds as renewable sources for the development of green surfactants. T. Benvegnu, et al., Top. Curr. Chem. 2010, 294, 143-164.

2. Lahaye, M., et al., Biomacromolecules 2007, 8, 1765-1774

3. Roussel, M., et al., Eur. J. Org. Chem. 2005, 3085-3094

4. Interactions and hybrid complex formation of anionic algal polysaccharides with a cationic glycine betaine derived surfactant, Rudy Covis, Thomas Vives, Cédric Gaillard, Maud Benoit, and Thierry Benvegnu, Carbohydrate polymers 2015, 121, 436-448.