

Table 12.1 Grades of alginates extracted from various seaweeds in their country of harvest (modified from [13]).

Species	Grade	Prominent harvest location
<i>Laminaria hyperborea</i>	High	France, Ireland, UK, Norway
<i>Lessonia negrescens</i>	Medium-high	Chile, Peru
<i>Laminaria japonica</i>	Medium	China, Japan
<i>Macrocystis</i>	Low	USA, Mexico, Chile
<i>Durvillaea antarctica</i>	Low	Australia
<i>Flavicans</i>	High	Chile, Peru
<i>Ecklonia maxima</i>	Medium	South Africa
<i>Ascophyllum nodosum</i>	Low	France, Ireland, Iceland, Norway, UK

The chemical structure and the corresponding functional property of the alginates derived from brown algae vary with the species used for extraction. Extraction of alginates from *Macrocystis* leads to medium viscosity or highly viscous alginates based on the extraction procedure employed, whereas the alginates extracted from *Sargassum* yield low viscous alginates. Alginates with the ability to form strong gels can be derived from *L. hyperborea* and *Durvillaea*, and those that form gels of soft to medium strength are extracted from *L. digitata*. Hence, the producers of alginates use a mixture of seaweeds to produce alginates of desired good quality. The quality of alginates and their composition and structural sequence are based on the taxonomy, species, age and type of seaweed, season and environmental conditions [10–12].

12.3 Extraction of Alginates

The alginates are commercially available as alginic acid, salts of alginates (sodium, calcium, potassium, and ammonium), and propylene glycol alginate. The chemistry behind extraction process of alginates from cell wall is the conversion of insoluble alginate salts in seaweeds to soluble form of acid and salts in water and alcohol accordingly.

The extraction of seaweed starts with the shredding and milling of seaweeds with 0.1–0.2 M mineral acid to extract the salts of alginates present in the cell wall. The acidification of milled seaweeds also helps in removal of contaminant glycans like fucan and laminarian [9, 14, 15]. The alginates extracted will be in the insoluble alginic acid form. This alginic acid gets converted to sodium alginate (soluble form of alginate) by treating the