39.13 - Natural polymers (for example, alginic acid) and modified natural polymers (for example, hardened proteins, chemical derivatives of natural rubber), not elsewhere specified or included, in primary forms.

3913.10 - Alginic acid, its salts and esters

3913.90 - Other

The following are some of the principal natural or modified natural polymers of this heading.

(1) **Alginic acid, its salts and esters**

Alginic acid, a poly(uronic acid), is extracted from brown algae (*Phaeophyta*) by maceration in an alkaline solution. It may be produced by precipitating the extract with a mineral acid or by treating the extract to obtain an impure calcium alginate which on treatment with a mineral acid is transformed into alginic acid of high purity.

Alginic acid is insoluble in water but its ammonium and alkali metal salts dissolve readily in cold water to form viscous solutions. The property of forming viscous solutions varies with the origin and degree of purity of the alginates. Water-soluble alginates are used as thickeners, stabilisers, gelling and film-forming agents in, for example, the pharmaceutical, food, textile and paper industries.

These products may contain preservatives (e.g., sodium benzoate) and be standardised by the addition of gelling agents (e.g., calcium salts), retarders (e.g., phosphates, citrates), accelerators (e.g., organic acids), and regulators (e.g., sucrose, urea). Any such additions should not render the product particularly suitable for specific use rather than for general use.

Among the esters is propylene glycol alginate which is used in foodstuffs, etc.

(2) **Hardened proteins**

Proteins are nitrogenous compounds of very high molecular weight of vegetable or animal origin. They are suitable for processing into plastics. The heading covers only proteins which have been chemically processed to harden them. Only a few are of commercial importance.

Hardened proteins are generally in the form of blocks of regular shape, sheets, rods or tubes. In these forms they are **excluded** from this heading (generally **heading 39.16**, **39.17**, **39.20** or **39.21**).

(3) **Chemical derivatives of natural rubber**

Natural rubber, which is a high polymer, forms, on chemical treatment, certain substances having the characteristic of plasticity.

These include :

(a) **Chlorinated rubber**. This is usually produced in the form of small white granules. It is used in the preparation of paints and varnishes which after application form a film resistant to atmospheric and chemical deterioration.

(b) **Rubber hydrochloride**. Generally used in packaging, and, when plasticised, for protective clothing.

(c) **Oxidised rubber**, obtained by oxidising heated rubber in the presence of a catalyst. It is a resinous material used in certain types of varnishes.

(d) **Cyclised rubber**, obtained by treating rubber with, e.g., sulphuric, chlorosulphuric or chlorostannic acids. This gives a range of products of varying hardness, used as a basis in the preparation of paints, for waterproof coatings, and to some extent in the manufacture of moulded products.

(4) **Dextran, glycogen (“ animal starch ”) and chitin and plastics produced from lignin**

This heading also includes isolated amylopectin and isolated amylose obtained by the fractionation of starch.

For the classification of polymers (including copolymers), chemically modified polymers and polymer blends, see the General Explanatory Note to this Chapter.

The heading **excludes** :

(a) Unmodified natural resins (**heading 13.01**).

(b) Etherified or esterified endosperm flour of locust beans or guar seeds (**heading 13.02**).

(c) Linoxyn (**heading 15.18**).

(d) Heparin (**heading 30.01**).

(e) Starch ethers and esters (**heading 35.05**).

(f) Rosin, resin acids and their derivatives (including ester gums and run gums) (**heading 38.06**).