

39.09 - Amino-resins, phenolic resins and polyurethanes, in primary forms.

3909.10 - Urea resins; thiourea resins

3909.20 - Melamine resins

3909.30 - Other amino-resins

3909.40 - Phenolic resins

3909.50 - Polyurethanes

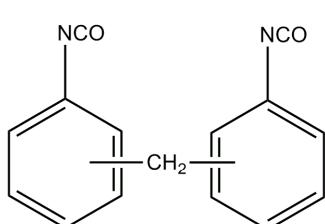
This heading covers :

(1) Amino-resins

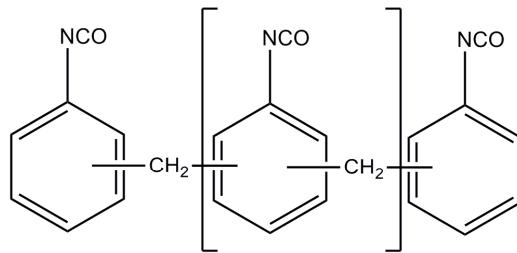
These are formed by the condensation of amines or amides with aldehydes (formaldehyde, furfuraldehyde, etc.). The most important are urea resins (for example, urea-formaldehyde), thiourea resins (for example, thiourea-formaldehyde), melamine resins (for example, melamine-formaldehyde) and aniline resins (for example, aniline-formaldehyde).

These resins are used for the manufacture of transparent, translucent or brightly coloured articles of plastics and are much used for moulding table and fancy ware and electrical goods. In solutions and dispersions (emulsions and suspensions), (whether or not modified with oils, fatty acids, alcohols, or other synthetic polymers) they are employed as glues and as textile dressings, etc. (See the General Explanatory Note to this Chapter, exclusion (b), for the classification of glues.)

Poly(methylene phenyl isocyanate) (often referred to as “crude MDI”, “polymeric MDI” or “poly(diphenylmethane) diisocyanate”) is an opaque, dark brown to clear, light brown liquid and is synthesised by reaction of aniline and formaldehyde to form a mixture of (methylene phenylamine) oligomers, which is subsequently reacted with phosgene and heat to form free isocyanate functions. The product is a chemically modified polymer of aniline and formaldehyde (a chemically modified amino-resin). It contains pure MDI and MDI oligomer mixtures. See chemical structures below :



Monomers MDI



Oligomers MDI ($n = 1$ to 6)

Polyamine resins, such as poly(ethyleneamines), are **not** amino-resins and fall in **heading 39.11** when complying with the requirements of Note 3 to this Chapter.

(2) Phenolic resins

This group comprises a wide range of resinous materials derived from the condensation of phenol or its homologues (cresol, xylanol, etc.), or substituted phenols, with aldehydes such as formaldehyde, acetaldehyde, furfuraldehyde, etc. The nature of the products varies according to the conditions under which the reaction is conducted and whether it is modified by the introduction of other substances.

Thus the group includes :

- (a) **Resins** (novolaks), which are permanently **fusible and soluble** in alcohol or other organic solvents, and which are produced under acid conditions. These are used in the preparation of varnishes and moulding powders, etc.

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- (b) **Thermosetting phenolic resins**, which are obtained under alkaline conditions. In the processing, a continuous range of products is obtained. Firstly, the resols in the form of liquids, pastes or solids which are used as varnish bases, impregnants, etc. Secondly, the resitols which are in the form of moulding powders, and finally, after complete reaction, resites which are most often in finished forms such as plates, sheets, rods, tubes or other articles generally classified in headings 39.16 to 39.26.

Certain resins of this kind are ion-exchangers and fall in **heading 39.14**.

- (c) **Oil-soluble phenolic resins** (soluble in drying oils) prepared from butylphenol, amylophenol, parahydroxydiphenyl or other substituted phenols. They are used mainly in the preparation of varnishes.
- (d) **Products** based on the resins referred to at (a), (b) and (c) above **modified** by the incorporation of rosin or other natural resins, synthetic resins (especially alkyd resins), vegetable oils, alcohols, organic acids or other chemicals which affect their solubility in drying oils. These products are used in the preparation of varnishes and paints, as surface-coatings or impregnants.

(3) Polyurethanes

This class includes all polymers produced by the reaction of polyfunctional isocyanates with polyhydroxy compounds, such as, castor oil, butane-1,4-diol, polyether polyols, polyester polyols. Polyurethanes exist in various forms, of which the most important are the foams, elastomers, and coatings. They are also used as adhesives, moulding compounds and fibres. These products are often traded as one part of a multi-component system or set."

This group also includes mixtures of polyurethane and unreacted polyfunctional diisocyanate (e.g., toluene diisocyanate).

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