

CLASSIFICATION OF ADHESIVES

Adhesives are classified by different classification systems:

- ☐ **General classification of adhesives (classification by structure)**
- ☐ **Classification of adhesives by curing method**
- ☐ **Classification of adhesives by origin**

Properties of some adhesives

General classification of adhesives

☐ **Thermosetting adhesives**

Thermosets molecules are cross-linked by strong covalent intermolecular bonds, forming one giant molecule. Cross-linking is irreversible therefore thermosets can not be reprocessed (re-melt). Cross-linking is achieved in curing process initiated by heat, chemical agents, radiation or evaporation of Solvents. Curing results in sharp increase of strength, elasticity and stability of thermosets. Most of thermosetting adhesives are based on epoxies, polyesters, polyimides and phenolics.

☐ **Thermoplastic adhesives**

Thermoplastics are Polymers, which soften (become pliable and plastic) and melt when heated. No new cross-links form (no chemical curing) when a thermoplastic cools and harden. Thermoplastics may be reprocessed many times by heating or applying a solvent. Molecules of most of thermoplastics combine long polymer chains alternating with monomer units. Polyamides, cyanoacrylates, polyacrylates, polyvinyl acetate (PVA) are typical thermoplastic adhesives.

☐ **Elastomeric adhesives**

Elastomers are polymers possessing high elasticity - may be reversibly stretched at high degree. Elastomers consists of long lightly cross-linked molecules. Elastomers are set (strengthened) by thermal curing or solvent evaporation. Curing results in increase of cross-linking of the molecules. Typical elastomeric adhesives are based on natural rubbers, silicones, acrylonitrile butadiene (nitrile), neoprene, Butyl, polyurethane, styrene-butadiene.

Classification of adhesives by curing method

☐ **One-part adhesives**

- ☐ **Heat activated curing adhesives.** Adhesives of this type (epoxies, urethanes, polyimides) consist of a ready mixture of two components.
- ☐ **Light/UV activated curing adhesives (acrylics, cyanoacrylates, urethanes).** Light activated adhesives are cured under a visible or UV light of appropriate wave length. Adhesives of this type usually contain photoinitiators enhancing curing reaction.

- ☐ **Moisture activated curing adhesives (RTV silicones, cyanoacrylates, urethanes).** These adhesives are cured when react with a moisture present on the substrate surface or in the air.
- ☐ **Anaerobics** - acrylic-based adhesives cured between metallic substrates, surfaces of which are deprived of oxygen.
- ☐ **Pressure sensitive adhesives (PSA).** Adhesives of this type do not cure. Adhesive bonding forms as a result of a pressure applied to the substrates. Theadhesion strength is determined by the pressure applied to the substrates. Typical example of pressure sensitive adhesive is self-stick tape.
- ☐ **Two-part adhesives (epoxies, urethane, acrylics, silicones).** A two-part adhesive is cured when its two (or more) components are mixed. The components react chemically forming cross-links of the polymer molecules.

Classification of adhesives by origin

- ☐ **Synthetic adhesives.** Typical synthetic adhesives are epoxies, polyurethanes, cyanoacrylates, polyimides, silicones, acrylics, polyamides, cyanoacrylates, polyacrylates, polyvinyl acetate (PVA), nitrile, neoprene.
- ☐ **Natural adhesives (glues)**
 - ☐ **Animal glue.** Animal glue is prepared by boiling animal bones and connective tissues containing protein.
 - ☐ **Casein.** Casein is made of skimmed milk. The main component of casein is protein contained in cow milk.
 - ☐ **Fish glue.** Fish glue is made of fish skin containing protein (collagen).
 - ☐ **Vegetable-based glues (tapioca paste, soybean glue, starch glue)** - aqueous dextrine-based glues.
 - ☐ **Natural rubber (latex) glue.** Natural rubber glues are prepared from water-based latex emulsion of plant origin.

Properties of some adhesives

(Materials Data)

- ☐ General purpose anaerobic adhesive
- ☐ High strength anaerobic adhesive
- ☐ Toughened acrylic adhesive
- ☐ General purpose cyanoacrylate adhesive
- ☐ Fast curing cyanoacrylate adhesive
- ☐ Maximum gap cyanoacrylate adhesive
- ☐ UV cure thixotropic urethane adhesive

- ▣ Single component high strength epoxy adhesive
- ▣ Two component fast curing epoxy adhesive
- ▣ Two component toughened epoxy adhesive
- ▣ Polyvinyl acetate adhesive

Source : http://www.substech.com/dokuwiki/doku.php?id=classification_of_adhesives