

Rosato's
Plastics
Encyclopedia
and
Dictionary



acrylonitrilic

during 1958; production was by Monsanto Co. using AN plastic "Barex" (Sohia of BP Chemical International) and Du Pont's stretched injection blow molding process. Unfortunately AN, at that time, was not permitted by the FDA to be used because of possible food contamination, thus stopping production in about eight plants on the East Coast. However it was the forerunner of an avalanche of containers to appear commercially in the 1970s and continue thereafter.

acrylonitrilic This family of plastics have repeat units that feature a nitrile side group ($C\equiv N$), such as polyacrylonitrile, polymethacrylonitrile, acrylonitrile-styrene, and acrylonitrile-methylmethacrylate plastics.

activated diffusion ▷ permeability

activation 1. Basically it is any process whereby a substance is treated to develop adsorptive properties. **2.** The process of treating a substance, molecule, or atom by heat, radiation, or the presence of another substance so that the first mentioned substance, molecule, or atom will undergo chemical or physical change more rapidly or completely. As an example, the process of inducing radio-activity in a specimen by bombardment with neutrons or other type of radiation.

activator An additive used to promote the curing of thermoset matrix plastics and reducing cure time by increasing the effectiveness of an accelerator.

actual versus theoretical properties

▷ data theoretical versus actual

adaptive control ▷ control, adaptive

addition polymerization It has been defined by the IUPAC as polymerization, usually to form linear polymers, in which the monomers add together to form the main part of each polymer molecule without the concurrent production of other small molecules such as water. A common type of additional polymerization is olefinic polymerization, in which the monomers are ethylene or its homologs. The term vinyl polymerization is used to denote addition polymerization of vinyl compounds. Similarly, vinyl-type polymerization refers to addition polymerization of monomers having a carbon-to-carbon bond, such as methyl methacrylate, vinylidene chloride, maleic anhydride, or tetrafluoroethylene. These addition polymerizations all involve the formation of polymers having a carbon-to-carbon single bond along the backbone.

In reality the addition-type process can occur in several ways. One way simply involves the external chemical activation of molecules

that cause them to start combining with each other in a chain reaction type fashion (by the bonding of atoms directly within the reacting molecule). Another way for an addition polymerization to occur is through a rearrangement of atoms within both reacting molecules. And still a third way is for a molecule composed of a ring of atoms to open and connect with other ring type molecules being opened up under the influence of the proper catalytic activators; again with no net loss of any atoms from the polymer structure.

additive Additives are basically physically dispersed in a plastic matrix without affecting significantly the molecular structure of the plastic (polymer). Cross-linking agents, catalysts, and others normally used in thermoset systems do purposely affect their structure. Additives are normally classified according to their specific functions rather than a chemical basis. It is also convenient to classify them into groups and to subdivide them according to their specific functions, such as: *mechanical properties modifiers*: reinforcements (fibers, flakes, whiskers, etc.), interfacing agents (makes additives and plastics compatible), toughening agents, plasticizers, blowing agents, particulate fillers, etc; *processing aids*: lubricants (internal and/or external), processing stabilizers, melt flow promoters, thixotropic agents, etc; *surface properties modifiers*: adhesion promoters, slip additives, anti-block additives, anti-wear additives, antistatic agents, blowing agents, etc; *physical properties modifiers*: blowing agents, flame retardants, hollow spheres, particulate fillers, etc; *optical properties modifiers*: nucleating agents, dyes, pigments, etc; *anti-aging additives*: fungicides, anti-oxidants, UV stabilizers, etc; *reducing formulation/manufacturing costs*: particulate fillers, blowing agents, reinforcements, etc; *electrical properties modifiers*: mineral and/or metallic fillers, glass microballoons, etc; *others*: biodegradable agents, preset explosive agents, flame retardants, syntactic fillers, foam/blowing agents, etc.

Unfortunately, there is no "ideal additive" since each of the infinite number of end uses will call for a particular set of characteristics, including diverging properties such as mechanical, physical, chemical, and electrical. To be realistic, the most important requirement of any additive is that it should be effective, for the purpose for which it was designed, at an economical level. Recognize that, like a see-saw, improvements in one property can lead to deterioration in others. Furthermore, the effectiveness of compounding additives depends also on correct procedure of incorporation into the

polymer matrix. However, initial compatibility are required to performance, such as in reinforcement materials.

The target is to set up the required in a compound and develop a compromise. Consider given to factors such as: cost, surface wetting and bonding, oil and chemical resistance, and required factors usually considered, part design requirements, are color, tenacity, density, thermal expansion properties.

The compatibility and diffusivities in plastic compounds is not by trial and error. The theories exist so that they can preliminary concepts to meet performance. The number of additive their possible combinations are their compositions are continually basic theories and knowledge of thermodynamics may be used to determine compatibility. ▷ **compounding**

additive concentrate ▷ concentrate

adduct A chemical addition product.

adhere To cause two surfaces to stick together by adhesion.

adherent A body that is held to another body, usually by an adhesive; a surface prepared for bonding. ▷ **adhesion**

adhesive One of the most important and most taken-for-granted applications of chemistry is adhesives. Adhesive bonding of metal and animal by-products has been known for thousands of years. With the advent of synthetic and thermoset plastics over the last half century, the field of adhesives took on a new dimension. Adhesives with strengths higher than those of metals have been developed. Adhesives of plastic adhesives have made possible adhesive bonding of structural parts in appliances, automobiles, bridges, aircraft, missiles, medical devices, and most other applications replacing welding and riveting. Familiar cans purchased in the past have been for decades sealed with adhesive, replacing soft solders. A rearview mirror seeming to float from the glass windshield; cyanacrylate adhesives are used.

Adhesive classification based on composition are: (1) synthetic plastics, thermosets, and elastomers.

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