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Allowing for Intramolecular Additions of Reactive Groups with High Affinity with Cation Dyes in Polyester and Other Fibers

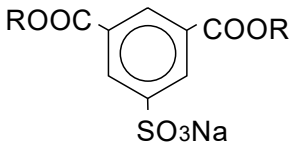
Modifiers for Cation-Dyeable Fibers

We offer SIPA, SIPM and SIPE-40L as modifiers for cation-dyeable fibers.

These products are chemical compounds which have the following structural formulas. They are used in order to impart cationic dyeability to fibers by their intramolecular additions to fibers mainly in the manufacture of polyester fibers.

In addition, these products are used for various applications because they allow for intramolecular additions to polyamide, polyurethane and other fibers, and impart hydrophilic properties, antistatic properties and other properties to them.

Structural Formula:



When using SIPA, R should be H.
When using SIPM, R should be CH_3
When using SIPE-40L, R should be CH_2CH_2OH.
SIPE-40L is a solution containing this compound and ethylene glycol (the mixing ratio is approx. 40:60 by weight).

The composition and typical properties of SIPA, SIPM and SIPE-40L are shown as follows:

Product Name	SIPA	SIPM	SIPE-40L
Composition	Sodium -5-sulphoisophthalic acid	5-Sodium sulfo dimethyl isophthalate	1,3-Benzendicarboxlic acid, 5-sulfo-, 1-3-bis (2-hydroxyethyl) esters, monosodium salts / Ethylene glycol solution*3
Appearance	White powder	White powder	Pale yellow liquid
Color (Hazen)	20 *1	10 *2	30
Saponification value	-	377	126
Acid value	418	0.2	0.2
Weak acid value	-	0.4	0.4
Water content wt %	0.3	0.2	0.2
Solubility	Soluble in water and lower alcohol	Soluble in warm water and DMF	Soluble in water and lower alcohol

Notice: The above values are representative.

*1 Measured using a 10 wt % aqueous solution
*2 Measured using a 10 wt % dimethylformamide(DMF) solution
*3 The ratio is 40:60 by weight

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Application Methods

1. Imparting Cationic Dyeability to Polyamide Fibers (nylon) and Polyester Fibers

- SIPA is suitable for polyamide polymerization methods
- SIPM and SIPE-40L are suitable for polyester polymerization methods.
  SIPM or SIPE-40L should be selected depending on the polymerization methods (the transesterification method, the direct esterification method), etc.
- The standard amount to be used is 2 to 5 mol % for the dicarboxylic component which is either polyamide or polyester raw material. If the amount is too low, the resulting fiber will not have the desired cationic dyeability. On the other hand, if the amount is too high, the resulting fiber will have a high hydrophilic property, causing lower fiber strength.
- SIPM and SIPE-40L have a high affinity with titanium oxide which is generally used to improve the whiteness of polyester fibers. Therefore, when titanium oxide is used, an ester oligomer should be synthesized by main components beforehand.
  Then, the after titanium oxide is uniformly dispersed in this solution, SIPM or SIPE-40L should be added for condensation polymerization.
  SIPA, if necessary, should also be used according to the above procedure because it also has a high affinity with titanium oxide.
- One feature of SIPA, SIPM and SIPE-40L manufactured by Sanyo Chemical, is that they have low amounts of insoluble impurities (e.g., polysulfone).
  This means that stable textile production is possible because spinning nozzles minimally plug in manufacturing processes, and high-strength fibers can be produced.
  As a feature of SIPE-40L, sediment minimally occurs in SIPE-40L solution at the time of storage due to its low content of ester oligomer. Also, this product exhibits stable dyeability when polyester fabrics are dyed with a cationic dye due to the intramolecular addition of SIPE-40L to polyester in the copolymerization process.

Precautions Against Mishandling

- SIPA, SIPM and SIPE-40L have a high affinity with titanium oxide which is generally used to improve the whiteness of polyester fibers.

  When these products are used as a raw material for fibers, including polyester, test the composition methods (e.g., timing of these products to be added, and the order) beforehand to ensure that there are no problems.

2. Functions of SIPA, SIPM, SIPE-40L and Their Envisaged Applications

SIPA, SIPM, and SIPE-40L can be used for the following applications by adding them to raw materials such as polyester, polyamide and polyurethane. Because these products have sulfonic acid groups they can take advantage of the following functions.

Additional Functions	Envisaged Applications
1. Cationic dyeability	Cation-dyeable fibers
2. Hygroscopic property, water absorbency	Anti-dewing or anticlouding films
3. Water solubility	Water-soluble resins, waterborne paints
4. Emulsifiability	Self-emulsifying resin emulsion
5. Antistatic property	Antistatic agents
6. Dispersibility	Filler dispersants, pigment dispersants

Important :
Before handling these products, refer to the Safety Data Sheet for recommended protective equipment, and detailed precautionary and hazards information.

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