



# Unlimited applications!

## Nittobo Medical's functionality polymers and their allied finished products (PAA, PAS, DANFIX)

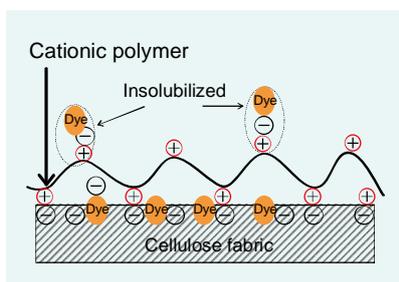
Nittobo Medical's polyallylamines (PAA) and polyamine series (PAS) are waterborne, cationic polymers, having exceptionally the unique characteristics. In addition, Nittobo Medical has been striving for the R&D and marketing of their allied finished products such as DANFIX, a fixing agent for cellulose fabrics. The followings are the main spheres where PAA and PAS are used among the industries at large because of their unique and exceptional characteristics.

### Auxiliary agent in textile processing

Recommendable grades:  
DANFIX series, PAA series, PAS series

#### Dye-fixing Agent

Fixing agent prevents the fabrics from color fading by washing, etc, by bonding chemically with unfixed excess dye on the fabrics.



DANFIX series improve the whole fastnesses to both reactive and direct dyeing for cellulose type of fabrics so that they are used in the dyeing factories in the world.

Features and advantages

1. Exceptional improvement of the fastness to washing, chlorine water or rubbing
2. Not inducing the degradation in light fastness, soft feeling touch or color, etc.

Recommendable grades:

DANFIX

#### Deep-coloring Agent

In case of dyeing cellulose fibers with acidic dye, direct dye or reactive dye, more excellent dyeing than you had expected can be attained. Especially they can be recommended for deep color dyeing, contrast dyeing or special printing.

Recommendable grades:

DANSHADE185  
PAA-15C

#### Cationizing Agent

With PAA and PAS being cationic, the surface of textile fabrics can be easily cationized by use of them. Above all, PAA and PAS are exceedingly effective in case of the fixation of anionic agents on the textile fabrics.

Features and advantages:

1. Especially PAA exhibit an excellent effect on cationization with less amount of addition because they have the higher density of cationics.
2. Aside from the fixation of anionic agents, PAA and PAS can impart another functionalities such as antimicrobial, antistatic property, etc.

Recommendable grades:

DANFIX  
PAA  
PAS

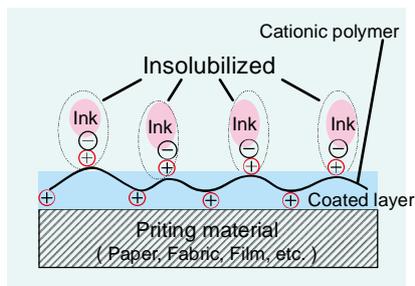
## Treatment-agent for ink-jet printing substrates

Recommendable grades:  
PAA series, PAS series

### Ink-fixing agent, Water-fastness Improver

Nowadays, with the increasing spread of more advanced ink-jet printers and digital cameras, the request for higher quality in such substrates as papers, fabrics and films, etc are becoming stronger.

Cationic polymers with superior interaction with inks are used for the purpose of the improvement of fixing and waterfastness properties, etc among the industries at large.



With Nittobo Medical's cationic polymers having a higher cationic density, they show not only the superior fixing with inks but also the exceptional waterfastness property without deteriorating color and lightfastness.

Features and advantages

1. Imparting an excellent waterfastness property.
2. Not deteriorating lightfastness and color.

Recommendable grades:

PAA  
PAS

## Agent for paper making

Recommendable grades: PAS series

### Sizing agent

Cationic polymers are important chemicals in paper making. PAS series are especially superior as a sizing agent in neutral paper making.

Features and advantages

1. Showing superior sizing effect with a small quantity.
2. Improving stability and retention of emulsion.
3. Longer time sustainable effect

Recommendable grades:

PAS-H-10L  
PAS-J-81

### Raw material of paper-strength agent

Various types of agents are added for the purpose of reinforcing the mechanical strength of paper. Nittobo Medical's PAS Series are utilized as a raw material of reinforcing agent which is effective on protecting the paper from the decrease in paper-strength and retaining the dimension stability in the wetted condition.

Recommendable grades:

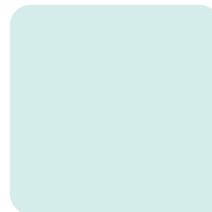
PAS-M-1

### Other applications in paper Making

Nittobo Medical's PAA and PAS Series, besides the above-mentioned applications, have been used in various spheres such as a drainage-improver for pulp slurry and deep-coloring agent for color papers.

Recommendable grades:

PAA  
PAS



## Metal processing agent

Recommendable grades:  
PAS series, Non chloride type, Low chloride type, DANFLAT series,

### Surface leveling agent in electrolytic plating

Since Nittobo Medical's PAS Series, its proprietary waterborne polycations, are very affinitive with metal-plated substrates, they have been exclusively used as a metal-surface-leveling agent among the metal processing companies for so many years at large.

Features and advantages

1. Higher leveling property
2. Excellent covering power
3. Excellent macro throwing power. (Homogeneous electrodeposition)

Recommendable grades:

PAS-A-1  
PAS-A-5  
DANFLAT

### Acid corrosion inhibitor

Nittobo Medical's PAS 92 shows an excellent effect as an acid corrosion inhibitor in an acid bath (hydrochloric acid, sulfuric acid, etc being used), a unit process called a pickling, in which the rust and others are removed.

Features and advantages

1. Extremely stable in an acid bath
2. Controlling excessive corrosion, etc.

Recommendable grades:

PAS-92

### Additive for metal cutting oils

Nittobo Medical's PAA and PAS Series have been used to a great extent among the lubricant manufacturers as an additive for acid type of metal cutting oils so many years.

Features and advantages

1. Excellent finishing of cutting-surface
2. Longer life of blade of cutter
3. Protecting a cutter and cutting-oil agents from corrosion, etc.

Recommendable grades:

PAA-03  
PAS-H-5L

## Water treatment agent

Recommendable grades:  
PAA series, PAS series

### Scavenger for heavy metals

Nittobo Medical's PAA and PAS Series catch the heavy metals in waste water, etc, then promoting their flocculation and precipitation.

Features and advantages

1. Excellent in chelating property and reactivity with heavy metals
2. Excellent in promotion of flocculation and precipitation

Recommendable grades:

PAA

### Decoloring agent

In dye-containing waste water treatment in the coloring, or coating factories, Nittobo Medical's PAA and PAS Series are used as a flocculant/precipitant for the dyes.

Features and Characteristics

1. Excellent flocculation
2. Higher clarity of treated water
3. Easier treatment of flocculent precipitates, etc.

Recommendable grades:

PAA



## Crosslinking agent for polymers

Recommendable grades:  
PAA series, PAS series

### Crosslinking or curing agent

Nittobo Medical's PAA are high reactive polymers, reacting easily with an epoxy group, urethane group, and carbonyl group, etc. When PAA are used as a curing agent for the functionality resins, inks and coatings, additional functionality can be imparted.

Features and advantages

1. Non volatile property
2. Crosslinking reaction possible at the lower temperature.
3. Impartment of additional functionality.

Recommendable grades:

PAA  
PAS  
PAS-880

## Anchor coating agent

Recommendable grades: PAS series

### Anchor treatment agent

Utilizing a unique reactivity of free type of polyallylamines, Nittobo Medical's PAA are already applied to some kind of film and coating products in an effort to enforce their adhesion.

Recommendable grades:

PAA Free type

PAA and PAS can be used for many fields.

Raw material  
of pharmaceuticals

Dispersant for  
pigments

Cleaning fluid for  
electronic materials

Antistatic agent

Antimicrobial, Algicide

Adsorbent for  
Formaldehyde

etc.

Development of customer grade  
in collaboration with customer

**Presentation**

Although a variety of grades of PAA and PAS series which differ in chemical structure or degree of molecular weight, and their derivatives are available to the customers as a catalog grade, if there is no recommendable grade for particular customer among them, we, at the Nittobo Medical specialty Chemicals Div., put forward willingly the development of a new customer grade product which will satisfy the customer's needs or requirements in collaboration with the customer.

Please feel free to ask us any question about the products handled by us or their technical matters.

Recommendation of appropriate grade

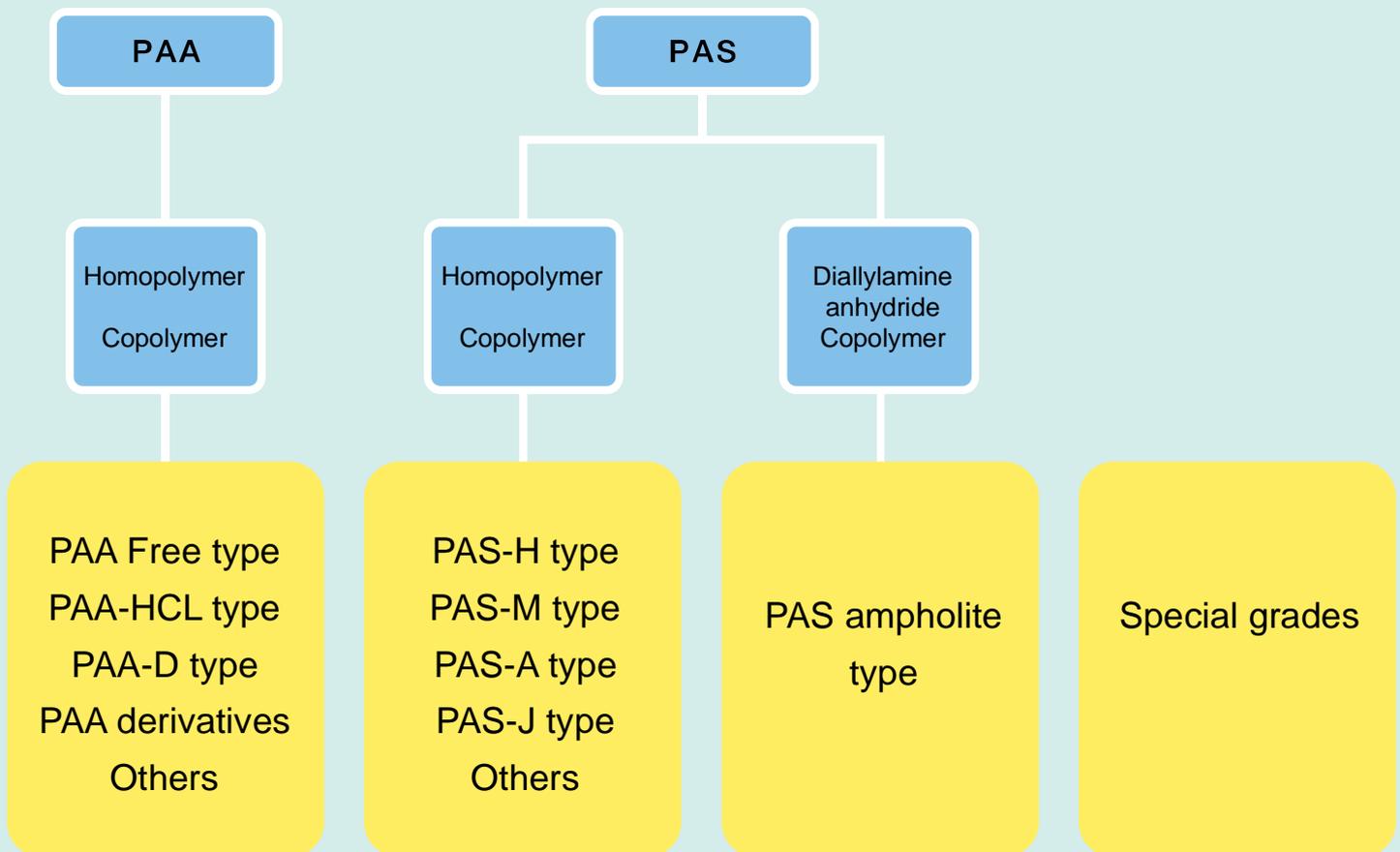
**Presentation**

The applications and recommendable grades described in this product catalogue are just an example. Please feel free to contact us to find out other application or appropriate grade for your application.

In addition, please note that if the more details of application including the purpose are disclosed to us, it will be possible for us not only to recommend a more appropriate grade to you but also to provide more of useful technical information on the application or evaluation.

# Nittobo Medical's functionality polymers, PAA, PAS

Nittobo Medical's polyallylamine (PAA) and polyamine series (PAS) are cationic, functionality polymers which are obtained by the polymerization of allylic type of amines. A variety of their copolymers and derivatives are used in a great many of the industrial spheres for many years.



Polyallylamines (PAA) manufactured through the proprietary, patent process which was developed by Nittobo Medical for the first time in the world, are functionality polymers, of which main constituent is a primary amine. They can be said as being best for the cationization or impartment of functionality for various kinds of materials.

Polyamine series (PAS) are higher-functionality cationic polymers, of which base polymers are diallylamine derivatives. Especially, their various types of copolymers are exceedingly unique in terms of the fact that they have a possibility of unlimited applications as a cationic polymer.

Various types of special grades of PAA and PAS such as non chlorine types, less chlorine polymer types, higher purity types and organic solvent types, etc. are lined up, taking into account the environmental pollution problems and constraint as well as responding to the customer's particular applications.

## Histories of R&D, patent application and marketing development

### History of Development

1963	Succeed in industrial synthesis technology of Poly Amine Sulfone (PAS) for the first time in the world.
1966	Start to put PAS on the market under the trade name of DANFIX as a fixing agent for direct dyes.
1974	Start to put PAS on the market as a corrosion inhibitor for acid bath or a brightener for galvanization.
1979	Start to put DANFIX on the market as a fixing agent for reactive dyes.
1982	Start to put PAS as a fixing agent for sizing in paper making process.
1984	Start to manufacture and sell PAA(Polyallyllamine) along with the success in the invention of its industrial manufacturing process.
1986	Along with the success in the development of application technology for PAA as a chemical for ink-jet printing papers, start to market them.
1987	Establish a desalting technology for hydrochlorides of PAA.
1989	Success in the development of application technology of amphoteric polymers as well as their industrial synthesis technology.
1991	Complete application technology of lower molecular weight types of PAA as a fixing agent for direct dyes.
1994	Start sales of polymer flocculants.
1996	Establish a proprietary manufacturing process of N-allylurethane type of PAA.
1997	Start to manufacture and sell the grades of lower molecular weight types of PAA. Apply for an international patent on invention concerning manufacturing of N, N-dialkylallylamine polymers.
1998	Establish a proprietary manufacturing process of high purity type of PAA.
1999	Start to manufacture and sell the grades of higher molecular weight types of PAA.
2003	Establish a proprietary manufacturing process of lower chloride content types of PAS.
2004	Establish a proprietary manufacturing process of free type of PAA.
2006	Start to manufacture and sell alcoholic solution type of PAA.