

Super Absorbent Polymer

AQUA KEEP



AQUA KEEP

Features

- AQUA KEEP can absorb water several hundred times more than its dry weight. It will retain most of the absorbed liquid, even under considerable pressure.
- AQUA KEEP has a narrow and controlled particle size distribution.
- AQUA KEEP demonstrates excellent flowability and good scatter uniformity in most feeding systems.
- AQUA KEEP is almost insoluble in water or other solvents.



As a result of the many years devoted to research and development of polymerization technologies, SUMITOMO SEIKA CHEMICALS CO., LTD. has achieved a unique form of super absorbent polymers, the AQUA KEEP line of products. Capable of absorbing water up to several hundred times more than its dry weight, AQUA KEEP performs better to meet other requirements of super absorbent polymers in the areas of controlled absorption rate, high gel strength, and high gel stability.

Several grades of AQUA KEEP are available, each optimized for absorption of various liquids such as water, saline solution, urine, blood, and seawater.

Very little residual monomer content remains in the product.

These advantages have led to AQUA KEEP's use in an expanding range of applications: from personal hygiene products (such as diapers and sanitary napkins), water absorbents, water-holding materials, dewatering agents, anti-dewing agents, to complex blends with rubber or other resins.

What are Super Absorbent Polymers?

This type of polymer can absorb and retain water several hundred times more than its dry weight without dissolving in water.

- Cellulose fiber or sponge** Absorbs water by capillary action and readily releases the water when pressure is applied.
- Super absorbent polymers** Hold water within molecular chains and retain the water even under pressure.

Principle

The absorption capacity of super absorbent polymers is determined by osmotic pressure, the polymer's affinity, and the polymer's rubber elasticity. The osmotic pressure has the most impact on the absorption capacity.

$$(\text{Water absorbing capacity}) \propto \frac{(\text{Osmotic pressure})^2 + (\text{Affinity})}{(\text{Rubber elasticity})}$$

Composed mainly of sodium polyacrylate, AQUA KEEP has a high content of COO^- and Na^+ ions. The difference between the ion concentration inside the polymer and that of the surrounding water solution determines the intensity of osmotic pressure. The lower the ion concentration of the surrounding water solution, the greater the resultant difference in ion concentration, and accordingly the osmotic pressure goes up. This osmotic pressure enables the polymer to absorb a large quantity of water. (Fig. 1)

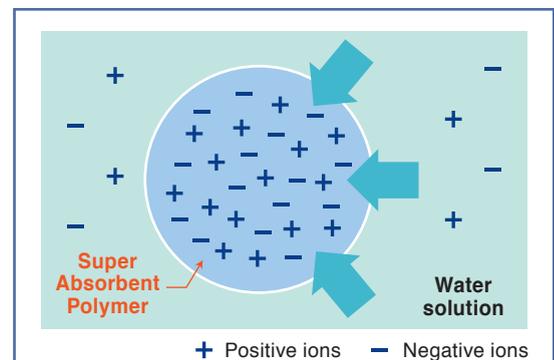


Fig. 1 Osmotic pressure

The affinity of the polymer with its surrounding solution also affects the absorption capacity of the polymer. The hydrophilic groups " COOH " and " COONa " in AQUA KEEP have a high affinity for water, allowing a water solution to be absorbed. The affinity, however, is less significant than osmotic pressure in determining the polymer's absorption capacity. (Fig. 2)

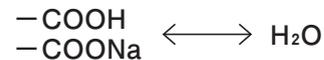


Fig. 2 Affinity

As a result of these two factors, the polymer should continue to absorb water to the extent that the ion concentration between inside the polymer and the surrounding solution equalizes. To control the water absorption to an intended level, the polymer must be provided with specific rubber elasticity.

The rubber elasticity of the polymer increases as the crosslinking density of that polymer increases. The absorption capacity of the polymer reaches its maximum when its rubber elasticity and its water absorbing power generated from osmotic pressure and affinity of the polymer are balanced. (Fig. 3)

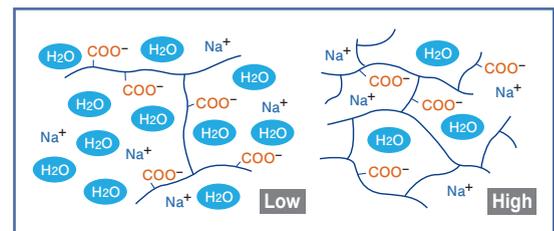


Fig. 3 Rubber elasticity (Crosslinking density)



Before addition



During addition



After addition

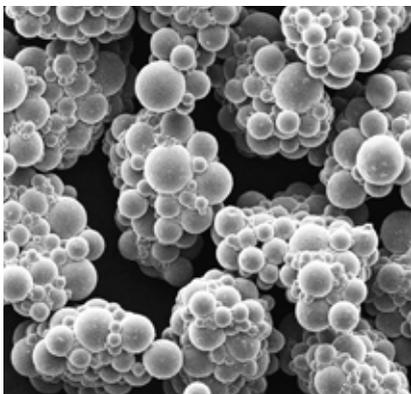
Line of products

Grade	Appearance	Particle form	pH		Bulk density (g/ml)	Medium particle size (μm)	Absorption capacity (g/g)		Absorption rate of 0.9% saline solution (sec.)
			0.9% saline solution	Ion-exchange water			0.9% saline solution	Ion-exchange water	
SA60S	White Powder	Aggregated sphere	6.2	7.2	0.70	350	60	400~800	40
SA60SX II					0.70	370	60	400~800	45
SA60N TYPE II					0.70	300	60	400~800	30
CA300N					0.80	200	60	400~800	20
10SH-PF		Granule			0.40	160	65	300~700	2
CA180N		Sphere			0.90	70	60	400~700	7
10SH-NF					0.85	25	55	200~500	8

*The above were measured by Sumitomo Seika's method and do not represent the specifications.

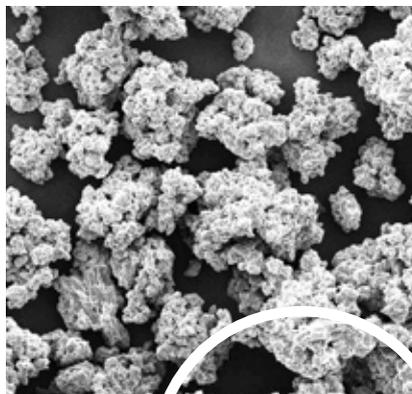
Electron micrographs

SA60S

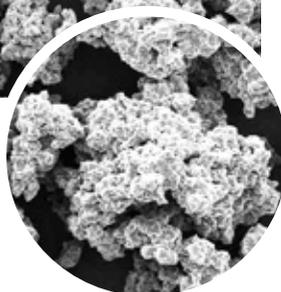


200μm

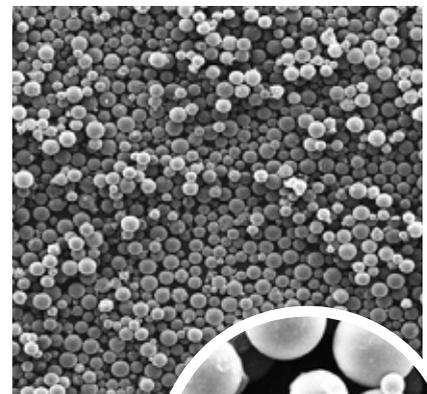
10SH-PF



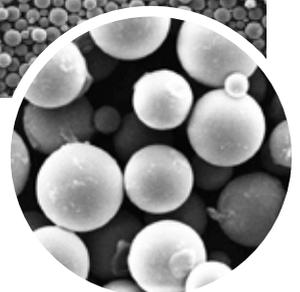
200μm



10SH-NF



200μm



Applications

Diapers
Napkins



Sanitary napkins



Baby diapers



Adult incontinence

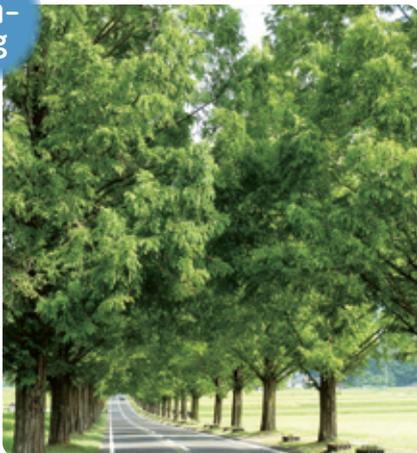
Pet pads



Water absorption pads



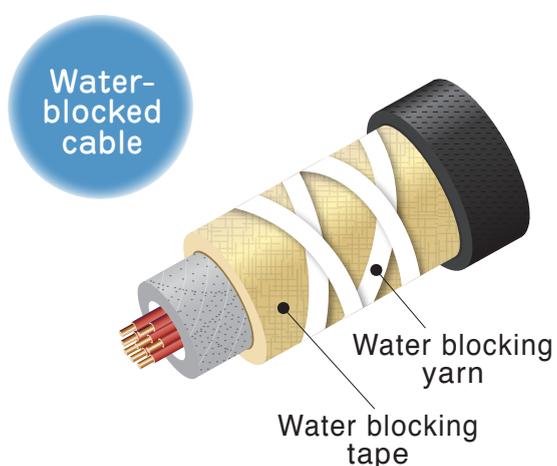
Plan-
ting



Refri-
gerant



Grades	Features	Main applications
SA60S SA60SX II	<ul style="list-style-type: none"> • High water absorption capacity • Water absorption capacity under high pressure • Good water absorption capacity (diapers) • Good flowability 	<ul style="list-style-type: none"> • Baby diapers • Adult incontinence
SA60N TYPE II	<ul style="list-style-type: none"> • High water absorption capacity • Good water absorption capacity (napkins and pet pads) • Good flowability 	<ul style="list-style-type: none"> • Sanitary napkins • Incontinence pads • Water absorption pads • Pet pads
CA300N	<ul style="list-style-type: none"> • Small particle (200 μm) 	<ul style="list-style-type: none"> • Water blocking tape for power / optical cable • Water absorption pads
10SH-PF	<ul style="list-style-type: none"> • High absorption rate • High swelling height 	<ul style="list-style-type: none"> • Water blocking tape/yarn for power / optical cable • Incontinence pads • Portable toilet • Water absorption pads • Water waste solidifier • Refrigerant
CA180N 10SH-NF	<ul style="list-style-type: none"> • Fine particle (20 to 70 μm) 	<ul style="list-style-type: none"> • Water blocking tape/yarn for power / optical cable • Water-swelling rubber



*Main applications explained herein are general examples.

SAFETY TESTS

Please contact us for details.

PRECAUTIONS

● Storage

Ensure that bags are completely sealed and stored in a well-ventilated indoor location, because AQUA KEEP is hygroscopic.

● Personal protection & Handling

- Wear a dust-protecting mask and safety goggles if dusting is excessive in an operating environment.
- Clean up immediately to avoid accidents because it can become slippery when wet.

● First Aid Measures

- **EYE CONTACT:** Contact with eyes may result in physical irritation. Rinse with plenty of water for 15 minutes. Get medical attention.
- **INHALATION:** Go immediately to an area with fresh and clean air. Get medical attention.
- **INGESTION:** Rinse mouth thoroughly. Get medical attention immediately.
- **SKIN CONTACT:** Flush skin with a large amount of water or soap water.

● Disposal

Dispose of in accordance with local regulations.

PACKAGING

Paper bag (15, 20kg)

Flexible container (500~1000kg)

* The packaging material depends on the product grade. Please contact us for details.

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