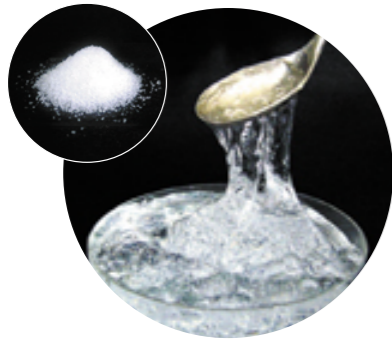


High Purity and High Quality

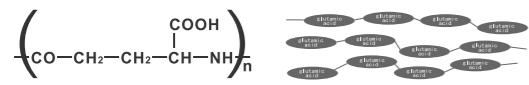
Polyglutamic Acid



Polyglutamic Acid, main component of sticky part of “natto (fermented soybean)”, is one kind of Amino Acid Polymers. Polyglutamic Acid is highly safe for living beings and environment because of its biodegradability. In future, it is expected to be used in various fields since it has features like high hydrophilicity, water retentivity and viscosity.

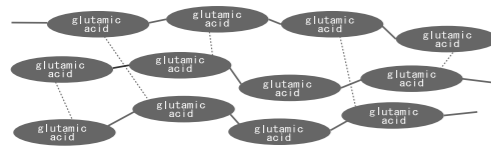
Polyglutamic Acid

A high polymer is an amide binding of γ -amino group and molecules, carboxyl group of glutamic acid.



Cross-linked Polyglutamic Acid

Polyglutamic Acid has been caused to be cross-linked. Molecular mass is from several million to tens of millions.



Special Features

Polyglutamic Acid is said to be the best biodegradable polymer for its multifunctionality and its compatibility with living beings.

- Harmlessness** : Safe to eat since it is approved as food additive.
- Water retentivity** : Effective for preventing drying-out as molecular combination structure can hold large quantity of water.
- Viscosity** : Provides viscosity to water. Viscosity increases with the increase of molecular mass and that is why, it can be applied for adjusting usability and product nature.
- Biodegradability** : Can be degraded by microbe for its food-borne natural ingredient.
※ Also it has features like slow-release, adiabaticity and conductivity.

Multi Functional High Polymer Flocculant

PG α 21Ca



Components

Organic cross-linked polyglutamic acid and inorganic calcium compounds.

Function

Effective for purification of various types of contaminated and waste water.

Special Features

- Fast formation of flocs and their fast precipitation (compared to our other products).
- Can be used for a wide range of pH(4-12) of water.
- Small changes in pH compared to other flocculants.
- Safety has been confirmed by several examinations at the institutions recognized by environment ministry.
- Can effectively remove heavy metals in water.
- Can reduce cost of sludge treatment since proportion of water in flocs is quite low.
- Can be used together with other flocculants, such as PAC.



PG α 21Ca (20kg)

Magnetized High Polymer Flocculant

PG-M



Components

Polyglutamic acid and iron oxide .

Function

Same as to PG α 21Ca and particularly effective for collection of rare metals.

Comparison with Conventional Construction Method (PAC + Polyacrylamide)

Item	Conventional Method	PG-M	Remark	
Basic Physicality	Shape	Water body	Powder Quality control of PG-M is easy since it is in powder form	
	Floc	Formation	Slow	Fast
		Settling speed	Slow	Fast
		Size	Small	Large
		Hardness	n/a	Hard
pH adjustment	Need	No need	PG-M can be used in a wide range of pH and it hardly causes any changes to pH.	
Danger of ingredients		High	Low PG-M is made from natural ingredient 'polyglutamic acid'. PAC and acrylamide monomer may cause Alzheimer disease and nerve toxin respectively. (Safety has been confirmed by Ames, dosage and acute toxicity tests.)	
	Industry waste water	Structure	Complex	Easy
Facility		Scale	Large	Small
		Maintenance	Complex	Easy
Heavy metal Removal	Impossible	Possible	PG-M can remove iron, hexavalent chrome and arsenic.	
Proportion of Water in floc	High	Low	PG-M has good dewaterability.	
Natural River, pond swamp	Environmental burden	High	Low	PG-M causes little change in pH and minimum affect on livings in water.
	Affect on livings in water	High	Low	

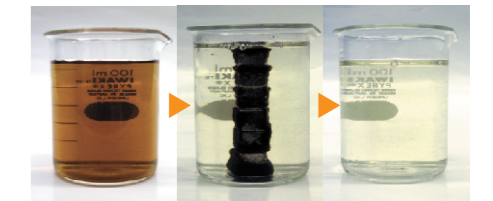
Appearance

- Grayish Black Powder

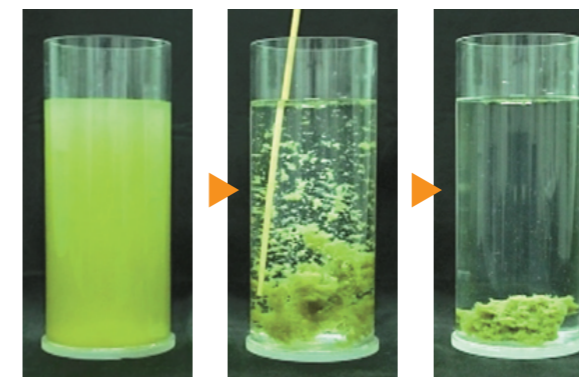
Characteristics

- Can gravitate and collect flocs with magnetic power.
- Safety has been confirmed by several examinations at the institutions recognized by environment ministry.
- It can be used in both sweet and salty water
- Its preservation, transportation and handling is easy since it is in powder form.

PG-M Treatment



Flocculation Process



When PG α 21Ca is added to water, flocs are formed for its two functions.

Function of inorganic ingredients

Inorganic ingredients of PG α 21Ca neutralize the function of negative charging and inactivate repulsing power among particles and finally condense the particles.

Function of Polyglutamic Acid (Anion polymer)

Polyglutamic acid with its function of carboxyl group (active group) works like glue that forms bridges among small particles.

Turbidity of water gets improved when contaminated particles form flocs and the flocs settle in the bottom or float on the top of water.

PG α 21Ca can treat all kinds of contaminated water.

What is flocculant?

Flocculant is a kind of medicine used to flocculate minute particles that cause filthiness dispersed in water and, to facilitate settling or floating of flocculated particles. The aggregate of minute particles is called floc. Clear water can be obtained by separating water from solid flocs.