UNEEKO

POLY GLU

MULTI-FUNCTIONAL HIGH POLYMER FLOCCULANT

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MULTI-FUNCTIONAL HIGH POLYMER FLOCCULANT PGA21CA

UNEEKO Pty Ltd supply PGa21Ca, a flocculant that has both organic and inorganic characteristics used for the purification of contaminated waste water.

Compared to other flocculants, this multifunctional flocculant has positive effects which are ideal for facilitating the decontamination of water ways around minesites.

SPECIAL FEATURES

PG*a*21Ca is a kind of flocculants that has both organic and inorganic characteristics of flocculants and is made up of organic cross-linked polyglumatic acid and inorganic substances like calcium compounds.

- Fast formation of flocs and their fast precipitation (compared to 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 recognised by environmental 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.

SAFETY TEST

Below is data collected from an evaluation test as medicine for use in city water (Japan Food Analysis Center)

ITEM	RESULT
Aluminum and its compounds	Within range
Cadmium and its compounds	Within range

Safety test (Tanabe R&D Services)

TEST NAME	ITEM	RESULT
Poison Test by giving oral dosage to both male and female mice	LD_{50}(mg/kg)	>2000
Mutation Test by using microbe (Ames Test)	Genetic Mutation	No indication

Water Poison Test (Center for Safety Evaluation of Agro Medicine used in food.

TEST NAME	ITEM	RESULT
Acute toxicity test of killifish	LC_{50}(mg/L)	>10,000

WHAT IS FLOCCULANT AND HOW DOES IT WORK?

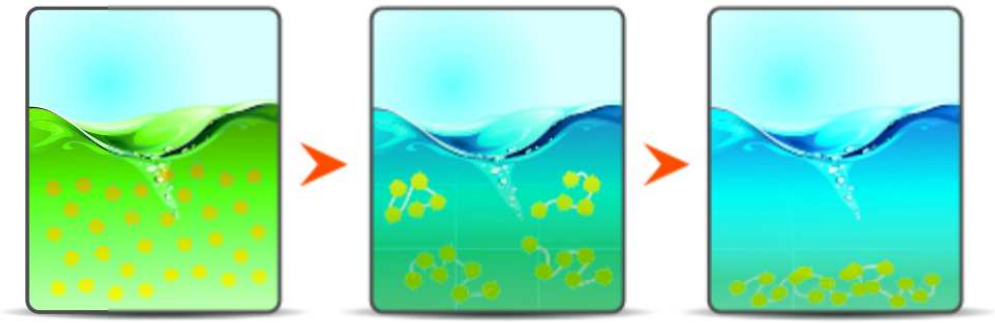
Flocculant is a kind of medicine used to flocculate minute particles that cause filthiness dispersed in water and to facilitate the settling of floating particles.

The aggregate of minute particles called floc. It is the separation of these solid flocs from the water which gives us clear water

In contaminated water, large numbers of minute particles float dispersedly. These small particles remain dispersed due to being negatively charged and repulse each other.

By using the multi-functional flocculant, the particles form together, settling at the bottom or floating to the top, making for clear water.

FLOCCULANT PROCESS



Raw Water ***Production of flocs*** ***Precipitation of flocs***

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

FUNCTION OF INORGANIC INGREDIENTS	FUNCTION OF POLYGLUMATIC ACID
Inorganic ingredients of PG*a*21Ca neutralize the function of negative charging and inactive repulsing power among particles and finally condense the parties	Polyglumatic acid with its function of carboxyl group (active group) works like glue, forming 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 the water

When PG*a*21Ca can treat all kinds of contaminated water.

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To the right are results from tests that have been completed on various types of contaminated water

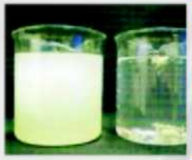
Waste water from gas station

	pH	TURBIDITY (Degree)	COLOUR (Degree)	COD (mg/L)	TOTAL PHOSPHORIC ACID (mg/L)	n-HEXANE MINERAL OIL (mg/L)	ANION SURFACTANT (mg/L)
Raw Water	6.75	50.4	533.7	20	0.527	60	4.3
Treated Water	6.69	4.58	<50	4	<0.1	0.010	0.99

Discharge water from silicon cut

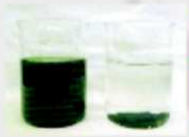
	pH	TURBIDITY (Degree)	COLOUR (Degree)	COD (mg/L)	TOTAL PHOSPHORUS (mg/L)	TOTAL NITROGEN (mg/L)
Raw Water	7.11	275.5	<1000	798.0	67.0	60
Treated Water	6.93	<20	116.9	11.72	0.111	0.010

Discharge water from civil works



	pH	TURBIDITY (Degree)	COLOUR (Degree)	COD (mg/L)	TOTAL PHOSPHORUS (mg/L)	TOTAL NITROGEN (mg/L)
Raw Water	6.59	230	<1000	<5	4	>60
Treated Water	6.57	<20	83.37	>100	2	<5

Quality test result of treated water of coal stock yard in heat power plant



	TURBIDITY (Degree)	COLOUR (Degree)
Raw Water	>1000	1068
Treated Water	<50	2.65

QUESTIONS & ANSWERS

1 *Q What industrial applications are they using the product for?*

Copper smelting:

Ironworks in Japan and China have been using the product

Machinery manufacture: e.g.

TOYOTA factory in Japan has been using the product for the

Treatment of waste water coming from polishing piston shaft in engine.

- ***Civil drainage:*** Many construction firms in Japan have been using the product.
- ***Livestock:*** Many pig farms have been using the product for the treatment of waste water.
- ***Oil industry:*** Oil field of oil sand in Canada has been using the product for separation of oil and sand.
- ***Building maintenance:*** When dismantling the building, asbestos is scattered. The product has been used to prevent it.
- ***River purification:*** Ministry of Land, Infrastructure and Transport is using the purification of some rivers in Japan.

2 *Q Are they using the product in any bulk applications? How many gallons a day do they treat in these applications?*

It varies greatly depending on the business category and need to be confirmed in the field of target drainage.

3 *Q What process do they use to apply the product to wastewater?*

It may be used in the first stage to the drainage. In addition, pre-treatment, post-treatment, there is also a case to be added to the current treatment.

For example, when used in pretreatment for seawater desalination plant using reverse osmosis membrane, Stress on the reverse osmosis membrane is reduced; the maintenance costs are dramatically reduced.

Q How does their product perform in reducing total suspended solids? Same question about total dissolved solids

For TDS or SS, the product will act from both sides

an ion(CN-) and Cat ion (CN+).

4 *Q What chemicals can their product treat?*

By the treatment process, the target is different. The use of pH adjustment, or agglomeration aids, spreads target range. Normally, individually, make the study of how to process material to target.

5 *Q What is a typical cost per gallon treated?*

Because the total amount is different by the target water quality, we cannot answer.

6 *Q What is the residual waste that is typically created?*

A flocculants used and suspended solids contained in object water.

7 *Q Have they used the product in any oil field applications?*

Yes they have.

PG*a*21Ca is used for the separation of oils and fats present in the water. In addition, the use of fats and oils to separation, such as shale oil is also available.

8 *Q Do they have any written marketing material that we can distribute to our team?*

Yes they have. Materials describing the general content are available.

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