MANUAL

on the use of
Flocculants Biomicrogel® BMG-C2

BIOMICROGEL®

Yekaterinburg, 2021

The manual was developed in “SPC BioMicroGel”, LLC on the basis of the technical specifications 20.16.59-002-20629059-2019 “Flocculant Biomicrogel®. Technical specifications”.

1. General information

1.1 Flocculant Biomicrogel® BMG-C2 is produced according to TU specifications 20.16.59-002-20629059-2019

1.2 The flocculant is a microgel-based water-soluble biopolymer obtained by modifying cellulose-containing raw materials.

1.3 The flocculant is used to purify water from fats, oils, petroleum products and separate oil-water emulsions. It improves organoleptic and chemical quality indexes in the treatment of natural and waste waters of industrial plants.

1.4 The physical and chemical properties of the product are shown in Table 1

Table 1. The physical and chemical properties of the product flocculant

Sr. No.	Parameter name	Standard
1	External view	Depending on the brand, a homoge-neous transparent liquid or paste free of foreign inclusions
2	Color	Light grey
3	The hydrogen indicator: 0.5 % aqueous solution, pH 2.0 % aqueous solution, pH	 6-10 7-10
4	ДDynamic viscosity according to Brookfield 0.5 % aqueous solution, MPa*s\ 2.0 % aqueous solution, MPa*s\	 700-720 30000-35000
5	Density of 0.5 % aqueous solution, kg/m^3	1,01-1,03
6	The waste water temperature at which the reagent remains oper-ational. C°	From 0 to +85

1.5 The flocculant is harmless to a human body if properly stored and used.

1.6 The flocculant does not have allergic and cumulative properties. It is non-toxic.

1.7 In case of ignition of a polymer container, finely-pulverized water, chemical or air-mechanical foam, sand, and all types of fire extinguishers should be used to stop fire spreading.

1.8 In case of emergency situations, personal protective equipment should be used: small-size industrial gas mask PFM-1 with a multipurpose protective canister PZU, butyl rubber gloves, special protective clothing, and shoes.

1.9 The flocculant is ecofriendly.

1.10 Use a sealed container to collect wastes and or a contaminated product and then dispose of them as Class5 Hazardous. Dispose of non-returnable or ineli-gible containers as household wastes.

2. Method of application

2.1 The flocculant is used as an aqueous solution in combination with an Activator. Depending on the composition of the treated water, it can be used in combination with other reagents (coagulants, polyacrylamides, alkalis, acids, and etc.).

2.2 The flocculant is supplied as a ready - made reagent for dosing in the form of an aqueous solution with an active substance content of 0.5% and 2.0 %. If considered necessary, a solution with an active substance content of 2.0% can be diluted to the required concentration.

2.3 According to this manual, the flocculant and activator are dosed into purified water once (without correction).

2.3.1 An aqueous solution of flocculant is added into the purified water with intensive stirring. A static mixer or a container with a mechanical stirrer can be used for stirring.

2.3.2 Approximate dosages of flocculant are 1-5 mg/dm3 measured by dry matter or 0.2-1.0 ml/l (0.2-1.0 l / m3) measured by treated water. The required volume of flocculant for wastewater treatment is determined during laboratory ex-periments.

2.3.3 After adding the flocculant to the treated water, an aqueous solution of the aluminum polyoxychloride activator is dosed with intensive stirring (~400 rpm) for 100-120 seconds. Otherwise, the water should flow through a static mixer for homogeneous distribution of the reagent in the entire volume of the treated water.

2.4 After stirring is over, a sediment flocculant is formed. It contains a contaminant which settles to the bottom or floats up depending on the type of contamination.

2.5 Subsequently, the formed sediment must be separated (extracted) from the treated water. The following technological processes are used for separation: flocculation, flotation, filtration, settling, mechanical dehydration.

2.6 The flocculant is not used in everyday life.

3. Methodology for efficiency evaluation of water purification from petro-leum products, dose selection of Flocculant Biomicrogel® BMG-C2

The method is based on the interaction between a flocculant solution (series C) and aggregates of petroleum products-aluminum polyoxychloride.

3.1 Equipment, reagents, solutions

- Laboratory dispersant IKA T25 ULTRA TURRAX with a stirring frequency of 15,000 rpm
- Turbidimeter HACH 2100Q
- Magnetic stirrer IKA RH digital with heating
- Laboratory scales ВЛТЭ-3100Т (3100g, 0.1 g)
- Glass test tube 50 ml, GOST 1770
- Glass B-1-50 TS, GOST 25336
- Glass B-1250 TS, GOST 25336
- Glass B-1-1000 TS, GOST 25336
- Glass pipette 5ML, GOST 29227
- Cylindrical separating funnel ВД-1-500, GOST 25336
- Distilled water, GOST 6709
- Analytical scales AND HR-150AZ
- Coagulant Aqua-Aurat 30 TU 2163-069-00205067-2007
- Flocculant Biomicrogel® BMG-C200.5-01
- Mobil oil “Mobil”, or any available synthetic engine oil;

It is acceptable to use other measuring instruments with metrological characteris-tics no worse than those indicated.

3.2 Preparation for the experiment

3.2.1 Preparation of a 0.5% solution of flocculant from a 2% solution.

Weigh 2.5 g of the BMG-C2 flocculant gel on the analytical scales and dissolve it in 100 ml of distilled water with a magnetic stirrer until it is completely dissolved.

3.2.2 Preparation of a 2% solution of aluminum polyoxychloride coagulant from Aqua-Aurat 30 with an active part content of 30% in the marketable product. Weigh 2.0 g of the coagulant Aqua-Aurat 30 on the analytical scales and dissolve it in 100 ml of distilled water with a magnetic stirrer until it is completely dissolved.

3.2.3 Preparation of the model emulsion.
Take 1 ml of engine oil with a pipette and add it to a glass with 1000 ml of distilled water, then stir it with a laboratory dispersant for 5 minutes at a rate of 1500 rpm.

3.2.4 When determining the specific dose of reagents to purify wastewater from petroleum products during the experiment, the initial wastewater should be purified; the model emulsion is not applied.

3.3 Experimental section

3.3.1 Put a glass with a model emulsion or wastewater on a magnetic stirrer and run the stirrer at a rate of 200 rpm. Use a pipette to add 1 ml of a 2% solution of Aqua-Aurat 30 coagulant into a glass with a model emulsion and stir the mixture for 2 minutes at a rate of 200 rpm. Subsequent adjustments are not allowed.

3.3.2 Add 1 ml of the flocculant solution. After the reagents are added, reduce the stirring rate to the minimum (the recommended value is 10-30 rpm) and continue stirring for 3 minutes.

3.3.3 When stirring is complete, a sediment of BMG-C2 Flocculant with petroleum products is formed, and it floats up or settles to the bottom within 5 minutes. If a visible sediment is absent, the wastewater sample is treated by dosing visible re-agents in increments of 1 ml.

3.3.4 The given mixture is separated with a separating funnel. To check flocculant BMG-2 efficiency, the lower transparent layer is selected.

3.3.5 A turbidimeter is used to evaluate purification efficiency (measurements are conducted according to the user manual). The turbidity should not exceed the value of 15 FNU (formazine Nephelometric Unit).

4. Processing of results

The complete result is taken as the arithmetic mean of two parallel defini-tions. The deviation should not exceed 1FNU.

5. Safe handling measures

5.1 In case of contact with the eyes or skin, rinse thoroughly with plenty of water, in case of contact with the stomach (by oral route), give plenty of liquid to drink, activated charcoal, and salt.

5.2 Use work wear, safety glasses and rubber gloves when working with BMG-2. If the work wear is dirty, it must be washed with a laundry detergent.

6. Manufacturer's warranty

6.1 The manufacturer guarantees the quality of the product in compliance with the requirements of operation, storage and transportation.

6.2 The guaranteed shelf life of the packaged product is 24 months as from the date of production.

7. Transportation and storage

7.1 The flocculant is transported in its original package by rail, road, sea, river, and air transport in accordance with the requirements applicable to this type of transport.

7.2 The flocculant is not classified as a hazardous cargo according to GOST 19433.

7.3 The flocculant is stored in the manufacturer's package in sheltered storage facilities protected from direct sunlight at a relative humidity of no more than 75% in conditions that exclude precipitation and dust penetration.

7.4 Storage near open flame is not allowed. All protective packaging should be retained.