DRINKING WATER PURIFICATION METHODS

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Abstract. *In this article, drinking water purification methods, underground water purification in "EKO-L" series equipment, and natural water purification in the Aral region, intended to obtain ecologically clean drinking water, based on local raw materials and components, are imported. Information is provided on the creation of test versions of equipment of the "EKO-L" series.*

Keywords: *π water, activated water, mineralized water, magnetized water, "ECO - L", "ECO-COMPANY", anode water, unstructured water, activated carbon, distilled water.*

Lack of clean drinking water in most regions of the world is currently an extremely acute problem. In particular, this situation is one of the first level problems for the region along the island in our republic. Currently, due to the lack of ecologically clean drinking water in this region, the population living here suffers from various diseases, including: salt accumulation in the joints, gall bladder, kidney and urine due to a violation of the salt-water balance in the body. it is noted that stone formation on the roads, gastrointestinal diseases have increased.

Living and dead water

Approximately 70% of the human body consists of water. Therefore, living and dead waters are used in the treatment of various diseases. It is mainly used to clean the organs performing the cleaning function (Kidney, liver, intestine). In addition, it is used in the treatment of colds, Angina, flu. It is also used in the treatment of skin burns, suppuration and other skin diseases. Living and dead water is also used in cosmetics to protect hair from shedding, and to clean the skin of the face. There are several technologies of purification in the production of drinking water. For example, water taken from underground is first distilled, that is, it turns into dead water. Then it is saturated with useful micro and macro fertilizers. In another technology, water taken from underground is first filtered, then disinfected and ozonized using ultraviolet rays. Nowadays, great attention is paid to the purity of water (Figure 1-2).

Figure 1. Water purity.

Currently, water filters, cleaning systems and cleaning equipment are getting a lot of attention. The reason for this is, firstly, the deterioration of the environment on earth, and secondly, the growth of the spiritual consciousness of each country.

It is possible to determine how clean the water is based on the analysis (Figure 2).

Figure 2. Water purity.

Living water 1 - according to the authors of the work, is divided into the following types:

1. Contained water
2. p water
3. Silver water
4. Yogurt water
5. Magnetized water
6. Water that holds good news
7. Holy water
8. Activated water
9. Mineralized water
10. Melt water
11. Fruit and vegetable juice
12. Spring and underground waters

Dead water is divided into the following;

1. Distilled water
2. Water with bad information
3. Unstructured water
4. Anode water
5. Passivated water
6. Water in swamps and rivers

Structured water is water in which hydrogen bonds are arranged. As a result, water molecules are placed in an orderly position relative to each other.

π water - was invented by Japanese scientists for the first time. The composition is energy microgrouped water.

Anode water is the water taken from the negative electrode. This water contains positively charged ions. The pH is less than 7 and the oxidation-reduction potential has a positive value. Such water is dead water.

Cathode water is taken at the positive electrode and captures negatively charged particles and the pH is high. In this case, the oxidation-reduction potential has a negative value. Cathode water is also called living water.

A mixture of cathode and anode waters is electrically activated water.

Good information storage water. This water remembers good words and thoughts and carries this information to the human body. For example, holy waters, obizamzam water.

Activated water is water enriched with biologically active substances, and the body easily absorbs this water. Because no energy is used to digest this water.

Melt water is water that first turns into ice and then melts. Therefore, this water retains the structure similar to ice. The process of freezing is carried out in 3 stages: In the first stage, the formed ice is first poured. At the next stage, the formed ice is separated from the solution that has not turned into a solid state.

Ground water - this water includes groundwater, spring water. These waters differ in shape from river and swamp waters. These waters acquire a different structure due to the influence of the earth's weak magnetic field. It is also enriched with other underground minerals.

The water of vegetables and fruits is also a type of structural water, and in addition to minerals, necessary cells are also found in it. Water accumulates inside the cell and does not occur separately. In this case, it forms a system connected to the cell and water.

Water rich in useful minerals is water that passes through minerals and is enriched with particles of these minerals. One of the most useful minerals is Ca and Mg. There is no taxological limit for Ca and Mg. Other minerals have a taxological limit. Therefore, in water mineralization, all minerals except Ca and Mg always require control.

Demineralized water is distilled water or water obtained by reverse osmosis. It has the ability to wash away the salts contained in the bone when it receives water. This high intake of water causes bones to become brittle and weak.

Magnetized water is water processed under the influence of a magnetic field, as a result of which it has an orderly composition and captures new information.

EXPERIMENTAL PART

Treatment of underground water in "EKO-L" series equipment

"RO-1000 I" drinking water purification equipment, purchased and put into operation by private entrepreneurs in the region since 2022, helps to partially solve the problem of providing the population with unpackaged and cheap drinking water. Due to the high cost of such foreign equipment and the need for hard currency to buy it, the scientists of Urganch State University and the private company "ECO-SOMPANY" based on mutual innovative corporate cooperation, based on local raw materials and components, "ECO-L" type power started to create cheap drinking water treatment equipment from 500 liters to 6000 liters per hour compared to imports.

It is known that only one percent of the available water reserves on the globe are suitable for consumption as drinking water.

For the production of drinking water purification equipment of the "EKO-L" series, the "EKO-500 L" and "EKO-1000 L" equipments with a capacity of 500 and 1000 liters per hour were tested in the laboratory conditions. studied and improved;

- "EKO-500 L" and "EKO-1000 L" equipment with a capacity of 500 and 1000 liters per hour were produced under the conditions of the private company "Ekokompani";

- technical conditions for drinking water purification equipment of the "EKO-L" series are developed, as well as the certification of these equipments and the development of technical passports and operational documents for them;

- In order to test the "EKO-500 L" equipment in industrial conditions, this equipment will be installed on the territory of Urganch State University, and the production of purified drinking water from underground water will be started;

- Production bases of "EKO-2000 L", "EKO-3000 L", "EKO-5000 L", "EKO-6000 L" equipment will be created.

The working principle of EKO-L" drinking water treatment equipment is shown in Figure 3.

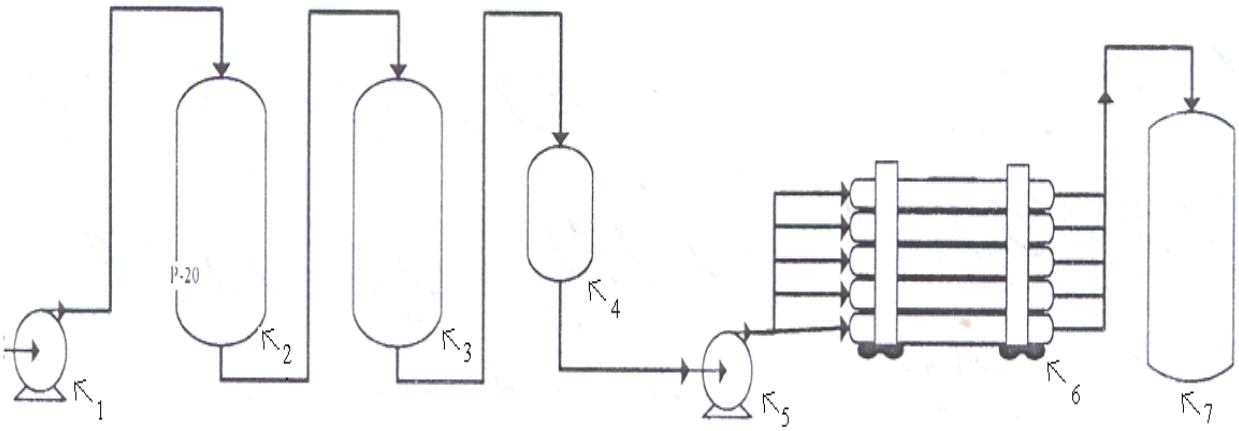

Figure 3. Technological scheme of drinking water treatment equipment of the EKO - L" series.

1. Water pump
2. Quartz filter
3. Activated carbon filter
4. A filter containing sediments
5. Multiphase pump
6. Reverse osmosis
7. Tank for clean water

EKO-L" drinking water treatment equipment works as follows.

1. Mainly cleans pollutants of large molecular size.
2. Mainly removes organic substances, chlorine residues, odor and color.
3. Mainly cleans it from rust, color in water, pollutants of small molecular size and prepares it for the next process.
4. RO membrane provides water at sufficient pressure.
5. Cleans water from ions, organic matter, colloid and bacteria.

Table 1 shows the composition of underground water before it is treated in the "EKO-L" drinking water treatment equipment.

Table 1

Composition of untreated groundwater

	Indicator	Value
1	Blurredness	2,0
2	pH	7,5
3	General hardness, (mg*ekv/l)	15 - 18

4	General minerality,mg/l	1800 - 2000
5	SO_4^{2-} (mg/l)	400 – 600
6	Cl^- (mg/l)	350 – 450
7	Ca^{2+} (mg/l)	200 – 235
8	Mg^{2+} (mg/l)	90 – 100
9	Na^+ (mg/l)	400 – 500
10	K^+ (mg/l)	200 – 300
11	HCO_3^{2-} (mg/l)	80 – 110

Table 2 shows the composition of underground water after treatment in the "EKO-L" drinking water treatment equipment.

Table 2

The composition of purified drinking water

	Indicator	Value
1	Blurredness	0,0
2	pH	7,0
3	General hardness (mg*ekv/l)	2 - 3
4	General minerality,mg/l	100 – 125
5	SO_4^{2-} (mg/l)	3 - 5
6	Cl^- (mg/l)	5 – 8
7	Ca^{2+} (mg/l)	20 - 25
8	Mg^{2+} (mg/l)	15 – 20
9	Na^+ (mg/l)	16 - 22
10	K^+ (mg/l)	14 – 19
11	HCO_3^{2-} (mg/l)	2 – 3

It is possible to assess the level of water purification by comparing the composition of underground water before and after purification by drinking water treatment equipment of the "EKO-L" series. Table 3 shows the composition and quality indicators of underground water before and after purification from drinking water treatment equipment of the "EKO-L" series.

It can be seen from this table that after the treatment in EKO-L equipment, the level of groundwater turbidity disappeared, the pH value decreased from 7.7 to 7.0, and the total hardness decreased from 18 to 3 (mg*eq/l). , Total minerality from 2000 to 125 mg/l, the amount of SO42- ions from 600 to 5 mg/l, the amount of Cl- ions from 450 to 8 mg/l, the amount of Ca2+ ions from 235 to 25 mg/l, the amount of Mg2+ ions from 100 to 20 mg/l, the amount of Na+ ions decreased from 500 to 22 mg/l, the amount of K+ ions decreased from 300 to 19 mg/l, and the amount of HCO3¬2- ions decreased from 110 to 3 mg/l.

Table 3

Quality indicators of the composition of underground water before and after purification from drinking water treatment equipment of the "EKO-L" series

	Indicator	Value	Value
1	Blurredness	2,0	0,0
2	pH	7,5	7,0
3	General hardness, (mg*ekv/l)	15 - 18	2 - 3
4	General minerality,mg/l	1800 - 2000	100 – 125

5	SO_4^{2-} (mg/l)	400 – 600	3 - 5
6	Cl^- (mg/l)	350 – 450	5 – 8
7	Ca^{2+} (mg/l)	200 – 235	20 - 25
8	Mg^{2+} (mg/l)	90 – 100	15 – 20
9	Na^+ (mg/l)	400 – 500	16 - 22
10	K^+ (mg/l)	200 – 300	14 – 19
11	HCO_3^{2-} (mg/l)	80 – 110	2 – 3

This equipment can be effectively used in remote villages and mountainous areas where water supply in other regions of our Republic has failed. If we consider that the number of people living in the area where drinking water treatment is necessary in our republic is more than 2 million people and the daily drinking water per person is about 3 liters, then their total need for drinking water for 1 day is 6000 m3 organizes. If the daily capacity of the equipment installed in each settlement (as well as schools, colleges, medical institutions and other organizations) is considered to be 12 m3 (500 liters per hour), then 600 water treatment equipment will be needed to supply such water. If the needs of industrial sectors are added to this, on average, it will be necessary to produce 1000 such equipment. In the production of each equipment of the above capacity, it is possible to save about 3000 US dollars in the production of 100 equipment per year, in exchange for saving about 3000 US dollars.

Classification of final results

Under the conditions of the private company "Ekokompani" equipment with a capacity of 500 and 1000 liters per hour - "EKO - 500 L", "EKO - 1000 L" equipment is produced, and the "EKO - 500" equipment is installed on the territory of Urganch State University, underground the production of purified drinking water will be launched. Also, the basis for the production of "EKO-2000 L", "EKO-3000 L", "EKO-5000 L", "EKO-6000 L" equipment will be created, and as a result, " The private company "Ekokompani" will have the opportunity to start their production.

CONCLUSIONS

1. Based on the available information on the chemical, bacteriological and other composition of natural water resources in the region, the methods of determining the quality indicators of the research objects were studied;

2. As a result of the purification of natural waters in the region of the island, test versions of equipment of the "EKO-L" series, designed to obtain ecologically clean drinking water, replacing imports based on local raw materials and components, were created;

3. "EKO-L" series equipment cleaned natural water resources in the region and determined the quality indicators of these objects;

4. In order to test drinking water treatment equipment of the "EKO-L" series in industrial conditions, this equipment was installed on the territory of Urganch State University.

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