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Classification of the Main Methods of Water Preparation, Their Field of Selection and Application

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Abstract: *The article provides information on the main methods of drinking water preparation, their classification, selection and field of application. Characteristics of drinking water are given mainly for underground and surface water sources.*

Keywords: *underground and surface waters, physical properties of water, water turbidity, chemical composition of waters, composition of drinking water.*

Introduction. In water supply, underground and surface waters are different according to their characteristics. The waters of open basins are distinguished by the abundance of bacteria, turbidity, flowering and low salt, while underground waters are distinguished by their color, clarity, lack of bacteria, high salt content, and the presence of iron, fluorine, and dissolved gases.

The physical properties of water include its temperature, turbidity, color, taste, and smell, and its chemical properties include the lack or abundance of chemical substances in water. The water temperature of rivers, canals, canals, ditches depends on the air temperature and varies around 0-300, while the change in underground water is less (5-150).

Turbidity is a characteristic of all surface waters. In rivers, sand and soil particles are formed by the washing of banks and riverbeds. Water turbidity varies greatly throughout the year.

Water turbidity can also be defined by the concept of clarity. To measure the turbidity of water, a certain amount of water is passed through a paper filter, and after being dried at 1050, it is weighed and measured. To measure the clarity, the water is placed in a glass cylinder prepared in a standard shape, the thickness of which is written on the bottom of the cylinder according to the standard. 1mm letters are legible. Water is increased and decreased gradually until these letters are clearly visible when viewed from above. The thickness of letters that can be read underwater and measured in millimeters indicates the clarity of this water.

The color of the water means the change of the color of the humic substances in the water. The color of water is measured in radii on the platinum-cobalt scale, and the taste and smell of water vary, and can be bitter, salty, sour, or sweet.

The smell of water can be natural or artificial, depending on the formation. Natural smell (rotten smell, mud smell, hydrogen sulfide gas, etc.) arises from living and non-living organisms, washing of shores, plants. Artificial odor (chlorinated, phenolic, petroleum, chlorophenolic, etc.) is created by untreated sewage entering the water.

The smell and taste of water is determined by the amount of pure water added to it. The taste and smell of water is measured on a conditional five-point scale:

1) very weak,
2) weak,
3) significant,
4) clearly,

5) strong.

The chemical composition of underground and surface waters is different and is characterized by the following main parameters: oxidation, dry residue, alkalinity, hardness, iron, manganese, chlorides, fluorides and other substances.

Source water selected for water supply must not contain harmful and unnecessary substances. The condition of the source is constantly monitored, and the content of drinking water in Table 1.1 is regulated as follows: In rivers, sand and soil particles are formed from the washing of banks and riverbeds. Water turbidity varies greatly throughout the year. To measure the turbidity of water, a certain amount of water is passed through a paper filter, and to measure the clarity, the water is put into a glass cylinder prepared in a standard shape, and letters 1 mm thick written according to the standard are read on the bottom of the cylinder. Water is increased and decreased gradually until these letters are clearly visible when viewed from above. Chlorides and sulfates (milligrams per liter) are found in underground and surface water in the form of sodium, calcium and magnesium salts. Iodine and fluorine (milligrams per liter) are found in pure form in underground and open water bodies. Turbidity is a characteristic of all surface waters. It is measured in water meters and nephelometers.

Table 1.1. Composition of drinking water.

No. Content of drinking water Quantity	No. Content of drinking water Quantity	No. Content of drinking water Quantity
1. Dense sediment 1000 mg/l	1. Dense sediment 1000 mg/l	1. Dense sediment 1000 mg/l
2. Chlorides (Cl-) 350 mg/l	2. Chlorides (Cl-) 350 mg/l	2. Chlorides (Cl-) 350 mg/l
3. Sulfates (SO -)	3. Sulfates (SO -)	3. Sulfates (SO -)
500 mg/l	500 mg/l	500 mg/l
4. Iron (Fe2+, Fe3+) 0.3 mg/l	4. Iron (Fe2+, Fe3+) 0.3 mg/l	4. Iron (Fe2+, Fe3+) 0.3 mg/l
5. Manganese (Mn2+) 0.1 mg/l	5. Manganese (Mn2+) 0.1 mg/l	5. Manganese (Mn2+) 0.1 mg/l
6. Copper (Cu2+) 1 mg/l	6. Copper (Cu2+) 1 mg/l	6. Copper (Cu2+) 1 mg/l
7. Zinc (Zn2+) 5 mg/l	7. Zinc (Zn2+) 5 mg/l	7. Zinc (Zn2+) 5 mg/l
8. Aluminum residue (Al3+) 0.5 mg/l	8. Aluminum residue (Al3+) 0.5 mg/l	8. Aluminum residue (Al3+) 0.5 mg/l
9. Hexomethophosphate (RO4) 3.5 mg/l	9. Hexomethophosphate (RO4) 3.5 mg/l	9. Hexomethophosphate (RO4) 3.5 mg/l
10. Tripoliphosphate (calculated to RO4) 3.5 mg/l	10. Tripoliphosphate (calculated to RO4) 3.5 mg/l	10. Tripoliphosphate (calculated to RO4) 3.5 mg/l
11. Beryllium 0.0002 mg/l	11. Beryllium 0.0002 mg/l	11. Beryllium 0.0002 mg/l
12. Selenium 0.001 mg/l	12. Selenium 0.001 mg/l	12. Selenium 0.001 mg/l
13. Molybdenum 0.5 mg/l	13. Molybdenum 0.5 mg/l	13. Molybdenum 0.5 mg/l

14. Nitrates (Calculate in N.) 10 mg/l	14. Nitrates (Calculate in N.) 10 mg/l	14. Nitrates (Calculate in N.) 10 mg/l
15. Polyacrylamide 2 mg/l	15. Polyacrylamide 2 mg/l	15. Polyacrylamide 2 mg/l
16. Lead 0.1 mg/l	16. Lead 0.1 mg/l	16. Lead 0.1 mg/l
17. Strontium 2 mg/l	17. Strontium 2 mg/l	17. Strontium 2 mg/l
18. Total hardness 1.5 mg/l	18. Total hardness 1.5 mg/l	18. Total hardness 1.5 mg/l
19. Kolinidex 7 mg-equiv/l	19. Kolinidex 7 mg-equiv/l	19. Kolinidex 7 mg-equiv/l
20. Stone and odor intensity <1000	20. Stone and odor intensity <1000	20. Stone and odor intensity <1000
21. Total number of bacteria <1 point	21. Total number of bacteria <1 point	21. Total number of bacteria <1 point

If any of the above indicators do not meet the requirements, it can be a reason to say that the source water is unsuitable.

If the presence of several of the above-mentioned substances is detected at the same time, the sum of their relative concentrations must be less than 1 and will be as shown in expression (1).

$$\frac{C_1}{C_1^1} + \frac{C_2}{C_2^1} + ... + \frac{C_m}{C_m^1} \le 1 \qquad (1.1)$$

here: C- the concentration of substances in mg/l, C1 - the standard concentration of these substances, mg/l

Dry residue refers to the total amount of organic and inorganic substances (excluding gases) in water (milligrams per liter). To determine it, a certain amount of water is evaporated, and the remaining residue is dried until its weight does not change at 105-1100.

Water hardness is characterized by the weight of calcium and magnesium salts dissolved in water. Water hardness is one of the main factors that determine whether water can be used or not. Water hardness is divided into general, carbonated and non-carbonated hardnesses. Total hardness means the sum of carbonated and non-carbonated hardnesses. Carbonate hardness refers to the presence of carbonate and bicarbonate salts of calcium and magnesium in water.

Non-carbonate hardness refers to the presence of non-carbonate salts, sulfates, chlorides, nitrates and silicates of calcium and magnesium in water. Water hardness is measured in milligram-equivalents per liter. The reaction activity of water characterizes the presence or absence of hydrogen ions in water, indicates the acidity or alkalinity of water.

The presence or absence of hydrogen ions in water is determined by ρN, and this expression shows the inverse logarithm of the amount of hydrogen in water. In a neutral reaction, rN=7, in an acidic reaction, rN<7, and in an alkaline reaction, rN>7. Alkalinity of water is measured in milligram-equivalents per liter and indicates the presence of bicarbonate, carbonate, hydrate and weak acid salts in water, so water is divided into bicarbonate, carbonate and hydrate alkalinity.

Oxidation of oxygen is measured in milligram-equivalents per liter, which indicates the presence of organic and rapidly oxidizing inorganic substances in the water, and it is assumed that sour humus also occurs in the form of iron.

Iron, measured in milligrams per liter, characterizes the presence of iron (II) oxide or iron (III) oxide in water. In underground waters, iron is often found in a dissolved divalent form, and in

surface waters it is found combined with colloids and other substances and again in the form of sour humic iron.

Manganese is determined by the number of milligrams per liter, and is often found together with iron in the form of iron (II) oxide with bicarbonate. Silicic acid, determined by the number of milligrams per liter, is different in surface and underground waters: in the form of compounds ranging from species to ionic forms. Water containing silicic acid cannot be placed in high pressure boilers. Nitrogenous compounds are found in water in the form of nitrate (HNO3) and nitric acid (HNO2) and ammonia. The presence of these substances in water indicates that it is contaminated with waste water. If there is ammonia in the water, the water has recently been polluted, if there is nitric acid, the water has been polluted for a long time. The above cases occur in unprotected open water bodies. Even if the above compounds are protected from the discharge of waste water, then these substances in the water indicate that they are formed from inorganic compounds.

Chlorides and sulfates (milligrams per liter) are found in underground and surface water in the form of sodium, calcium and magnesium salts. Iodine and fluorine (milligrams per liter) are found in pure form in underground and open water bodies. These substances have great hygienic importance for the health of the population. Free gases oxygen, hydrogen sulphide, carbonic acid are widely found in underground and surface waters.

Although the presence of oxygen and carbonic acid in water does not affect the drinking properties of water, it rusts metals and corrodes concrete. If there is hydrogen sulfide in the water, it smells bad, and such water corrodes metals. Water becomes contaminated with bacteria and viruses from untreated sewage and rain washing down the banks, from people bathing, and from watering animals. The daily water consumption demand in industry is shown in the graph. . The presence of these substances in water indicates that it is contaminated with waste water.Suvning bakteriya bilan ifloslanganligi bir millilitr suvdagi bakteriyalar soni bilan xarakterlanadi.

1. According to the state standard, the following requirements are imposed on the quality of water used by the population and used in the economy:
2. Turbidity should not be more than 1.5 milligrams per liter;
3. The clarity of the letter when read under water should not be less than 30 cm;
4. The color should not be more than 200 on the platinum-cobalt scale;
5. The taste and smell should not be more than 2 points out of 200;
6. The amount of iron should not exceed 0.3 milligrams per liter;
7. The amount of fluorine should be 0.8-1.5 milligrams per liter;
8. Hardness should not be greater than 7 mg-equivalent per liter.
9. Lead 0.1, antimony 0.05, copper 3, zinc 5, manganese 0.3 milligrams per liter of drinking water.
10. When one milliliter of drinking water is stored in a special feed at 370 for 24 hours, the number of bacteria grown from it should not be more than 100, and the number of Escherichia coli bacteria in the water should not be more than three.

The reaction activity of water should not be less than 6.5 and not more than 9.5. When chlorine is added to water, it is important that the water does not smell of chlorophenol. The optimal temperature of water for drinking and household purposes is considered to be 7-100, and consumption of water up to 350 is allowed [20,21,22].

The source of water for drinking and domestic purposes is selected in accordance with state standards. A water source selected in accordance with these state standards should not exceed 1,000 milligrams of dry matter per liter. If there are no such sources of water, it is possible to sweeten water with chloride and sulfate and make it drinkable.

Conclusion: The requirements for water consumed by industrial enterprises are different and depend on the product and production process of the industrial enterprise. In an industrial enterprise, a lot of water is used to cool technological equipment. For this, the water should not be hard and should be as little cloudy as possible.

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