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HYGIENE OF WATER SUPPLY

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water

Water physiological functions:

- Flexibility – about 65 % of body mass of adult person consists of water.
- 70 % of water is the intracellular water, 30 % - extracellular water (in blood), (7%) – lymph and 23 % - inte l.
- Participation in metabolism and interchange of energy.
- Role in support of osmotic pressure and acid-base balance.
- Participation in heat exchange and thermoregulation.
- Transportation function – delivery of nutrients to cells with blood and lymph, removal of waste products from the organism with urine and sweat.
- As a component of dietary intake and a source of macro- and microelements

EPIDEMIOLOGICAL AND TOXICOLOGICAL ROLE OF WATER

Water can participate in spread of infections in the following ways:

- **As transfer factor of pathogens with the fecal-oral transfer mechan nteric infections of bacterial and rigin (typhoid, cholera, dysente.., salmonellosis).**

- **As a transfer factor of pathogens of the skin and mucous membrane diseases (when swimming or having another contact with water) trachoma, leprosy**

SYMPTOMS OF WATER EPIDEMICS:

- Simultaneous appearance of big number of enteric infected people.
- People who used the same water source.
- Morbidity level will stay high for the long period of time to the extent of water contamination and consumption.
- After the taking of antiepidemic measures the outburst fades aw orbidity goes down drastically.

- **Toxicological role of water consists in it containing chemical agents that may negatively influence people health causing different diseases.**

Balneal role of water

Water is used in medicinal purpose for rehabilitation of convalescents (drinking of mineral waters, medicinal baths),

resort Baden-Baden

and also as tempering factor (bathing, swimming, rubdown).

WATER

Sanitary-hygienic and domestic functions of water include:

- Water usage for cooking and as a part of dietary intake.
- Usage of water as means of keeping body, clothes, utensil, residential and public premises and industrial areas, settlements clean.
- Watering of the green areas within settlements.
- Sanitary-transport and disinfection functions of water – disposal of residential and industrial waste through sewer system, waste processing on plants, self-purification of water reservoirs.

Economical functions of water:

- Use in agriculture (irrigation of vegetable and gardening, greenhouses, poultry and cattle breeding farms).

- Industry (food, chemical, metallurgy).

- As the route of p[illegible]nd cargo transportation.

SOURCES

Water supply sources are divided into ground and surface:

1. Middle waters with pressure (artesian) and without pressure.

Middle waters are characterized by not very high, stable temperature (5-12°C), constant physical and chemical composition, steady level and considerable flow.

2. Underground waters that are located in aquifers above the first impermeable soil and that reach

3. Spring water, flowing out from aquifers that pinch out onto the surface due to descending on the hill slope, in deep ravine.

Spring water

Surface waters are divided into flowing (running) and stagnant waters.

Open-air reservoirs can easily be polluted from outside, therefore, from epidemiological point of view they are potentially unsafe.

Compared to ground waters, surfacewater sources are characterized by big amount of suspended substances, low clarity, higher colour due to humic substances that are washed away from the soil, higher content of organic compounds, presence of autochthonic micro flora and dissolved oxygen.

Sources of the surface water reservoirs pollution

- The main source of pollution of surface water reservoirs are sewage waters that are created as the result of the water use in private life, industry, poultry and

Self-purification (natural purification) of open-air water reservoirs

Self-purification (natural purification) of open air water reservoirs takes place in the result of various factors' effect:

a) **Hydraulic (mixing and dilution of pollutants by water of water reservoir)**
b) **Mechanical (precipitation/sedimentation of suspended solids)**
c) **Physical (solar radiation and temperature effect)**
d) **Biological (interaction of water plant organisms and microorganisms with sewage organisms that got into reservoir)**
e) **Chemical (elimination of contaminants as the result of hydrolysis)**
f) **Biochemical (conversi… into other due to biologica…**

Technique of sanitary inspection of water-supply sources

Sanitary inspection includes three main stages:

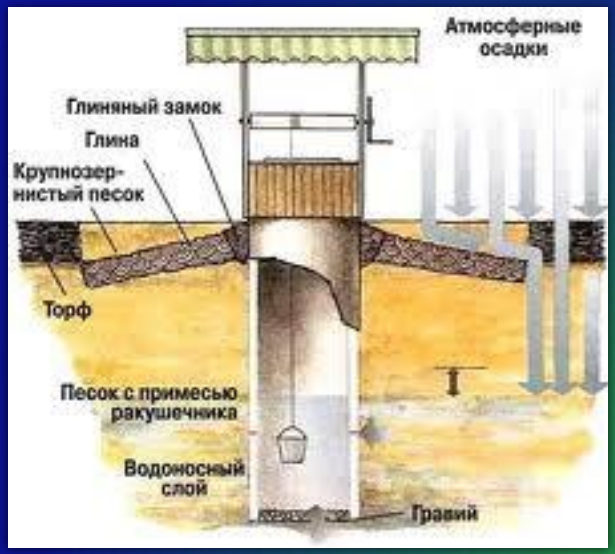
1) **Sanitary-topographic inspection of water source environment.**
2) **Sanitary-technical inspection of condition of water source equipment.**
3) **Sanitary-epidemiological inspection of area of water source location.**

Main task of sanitary-topographic inspection of water source is to discover possible sources of water pollution (dumps, refuse pits, livestock farms), distances from them to water source, topography of the locality.

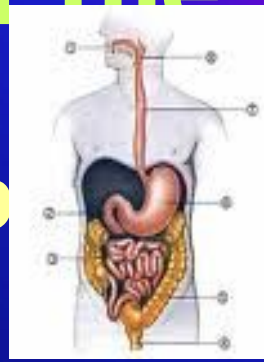
On the basis of sanitary-topographic inspection a map – layout of positional relationship of water source and listed objects.

Sanitary-topographic Inspection.

The purpose of sanitary - technical inspection is to give a hygienic assessment of condition of technical equipment of hydraulic works at water source.



Sanitary-epidemiological inspection is aimed to discover and consider the following:



- Presence of intestinal infectious diseases (cholera, typhoid, paratyp A, B, dysenteries, virus hepatitis) among population.
- Presence of epizootic diseases (tularaemia, brucellosis, anthrax, murrain) among rodents, domestic animal.
- Sanitary condition of the settlement (pollution of the territory, methods of collection and disinfection of liquid and solid domestic and industrial waste).

During water sampling from open reservoir or a well the temperature of water is measured by a special thermometer (fig. 1).

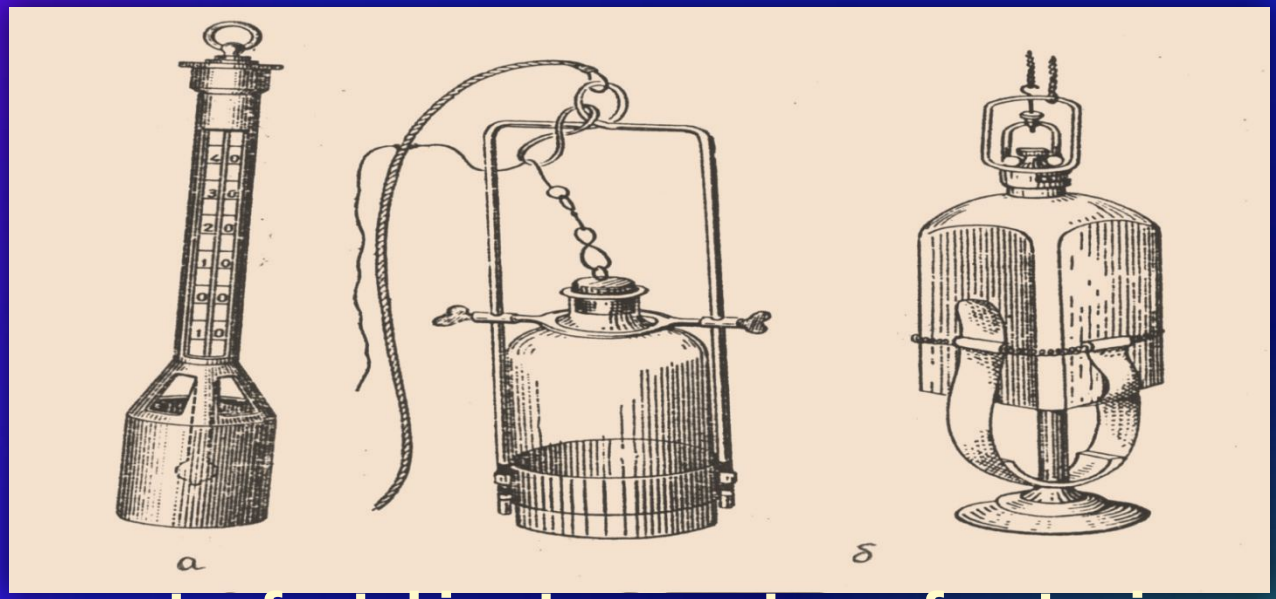


Fig. 1. Thermometer for taking temperature of water in reservoirs and wells (a), bathometers for water sampling for analysis (b).

Water sampling from open reservoirs and wells is carried out using bathometers of different design (fig. 1-b).

Depending on water quality and water treatment methods, which are necessary for getting good quality drinking water, ground and surface water sources are divided into three classes.

Water quality criteria	Type of water source					
	ground waters			surface waters		
	class					
	I	II	III	I	II	III
Organoleptic:						
Odor at 20°C and 60°C, points	2	2	2	2	3	4
Tastes, points	2	2	2	2	3	4
Turbidity, mg/dm^3	1,5	1,5	10	20	1500	100000
Colour, degrees	20	20	50	35	120	200
Temperature,°C	8-12	8-12	8-12	8-25	8-25	8-25
Hydrogen sulphide, mg/dm^3	-	3	10	-	-	-
Appearance	without admixtures visible by the naked eye					

Water quality criteria	Type of water source					
	ground waters			surface waters		
	class					
	I	II	III	I	II	III
Indicators of natural chemical compound (selectively):						
Solid residue, mg/dm^3	1000-1500			1000-1500		
pH	2	2	2	2	3	4
Hardness, mg equiv./dm^3	7-10			7-10		
Chlorides, mg/dm^3	350			350		
Sulphates, mg/dm^3	500			500		
Iron, mg/dm^3	0,3	10	20	1	3	5
Manganese, mg/dm^3	0,1	1,0	2,0	0,1	1,0	2,0
Fluorine, mg/dm^3	1,5	1,5	5,0		0,1-0,5	
Nitrates, mg/dm^3	45			45		

Water quality criteria	Type of water source					
	ground waters			surface waters		
	class					
	I	II	III	I	II	III
Indicators that characterize epidemic safety and natural purification of water reservoirs:						
a) sanitary-microbiological:						
Number of saprophitic microorganisms in 1 cm^3 of water	100			1000-2000		
Number of colon bacilla group bacteria (CBGB) in 1 dm^3 of water	3	100	1000	1000		
Number of lactose positive colon bacilla (LPCB) in 1dm^3 of water	-	-	-	1000	10000	50000
Number of enterococci, in 1 dm^3 of water	-	10	10	-	1000	-
Pathogenes of enteric infections (salmonellas, shigellas, enteroviruses)	mustn't contain			salmonellas and entero-viruses may be contained in 10% of samples		
b) sanitary-chemical:						
Permanganate oxidizability, mg/dm^3	2	5	15	7	15	20
Ammonia salts, mg/dm^3		0,01-0,1			0,01-0,1	
Nitrite nitrogen, mg/dm^3		0,005			0,005	
Nitrate nitrogen, mg/dm^3		0,1			0,1	
Dissolved oxygen, mg/dm^3		-			4,0	
BOD_{20}, mg O_2 /dm^3		-		3	5	7

Hygienic characteristics of water supply systems of settlements

There are centralized and decentralized water supply systems.

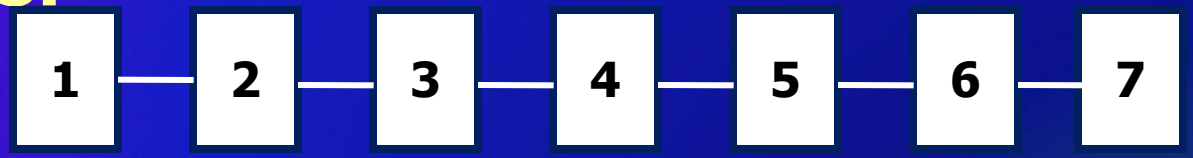
Centralized system (water pipeline) includes: source of water, water intake facility, water-lifting facility, main facilities of water supply station, where water clearing, discolour, disinfection are executed, and sometimes there also takes place special water treatment (fluorination, defluorination, deferrization) to improve water quality.

Most often decentralized (local) water supply is realised using shaft or tube wells, and more rarely using groundwater intake structures (catchments). Underground (subterranean) water, which accumulates in waterbearing aquifer over the first water-holding horizon

CLASSES AND METHODS OF WATER TREATMENT

Water of I-class ground sources totally meets the concept of the good drinking water quality, it's quality is totally compliant with those for drinking tap water according to SS 2874-82.

In this case water-supply diagram looks as follows:



where: 1 – ground source of water–supply (artesian or not-artesian middle waters)
2 – artesian well
3 – lifting pump I
4 – disinfection
5 – pure water reservoir
6 – lifting pump station II

Water of II-class ground sources may contain hydrogen sulphide of mineral origin, much higher content of iron and manganese. This deteriorates its organoleptical properties and causes the need to use special methods of treatment (aeration, deferrization by aeration with further filtration).

In this case water supply diagram looks as follows:

where: 1 – ground source of water–supply

2 – artesian well

3 – lifting pump I

4 – special methods of water treatment

5 – disinfection

6 – pure water reservoir

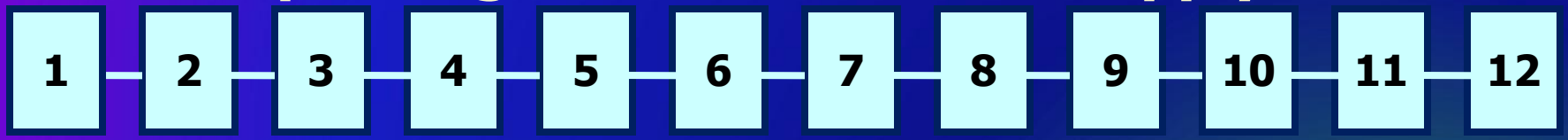
7 – lifting pump station II

8 – water-supply network.

Water of II-class sources have higher concentration of suspended materials in their water with more colour, have higher iron content, relatively high level of bacterial contamination and rather big amount of plankton.

For purification of such water conventional methods of such treatment are used: microfiltration - to remove plankton, coagulation with water precipitation and further filtration.

Principal diagram of such water-supply is:



where:1 – surface water source
2 – scoop (water intake facility)
3 – coastal water intake well
4 – lifting pump station I
5 – chamber for water head reduction, which simultaneously serves for mixing water with coagulant solution
6 – reaction chamber
7 – sediment chamber
8 – high-rate filter
9 – disinfection
10 – pure water reservoir
11 – lifting pump station II
12 –water-supply network.

Water of III-class surface sources is of such quality that it cannot be changed according to SS 2874-82 requirements using conventional methods of purification.

For such water purification it is necessary to use additional stages of water clarification, application of oxidative and sorption methods, more

METHODS OF THE IMPROVEMENT OF QUALITY OF WATER

- There are 3 basic groups of methods:

1. Methods of water cleaning - removal from mechanical impurity and improvement organoleptic parar of water (turbidy, colouring).

2. Methods disinfecting of water - microflora in water.
3. Special methods improvement quality of water – distillation, dechlorination, fluorization, defluorization, deodorization, decontamination

Methods water cleaning.

Water cleaning will be carried out by upholding and filtration water through filters (slow and fast filters).

For acceleration cleaning used coagulation water - adding salts Al or Fe - are formed flakes with salts Ca or magnesium in water.

Now use flocculants polyacrylamid.

- The control efficiency of water cleaning:

a) On organoleptic parameters - turbidy, colouring, smell, taste

b) On oxidability water.

Methods disinfecting of water and their hygienic estimation

There are 2 groups of methods of disinfecting:

1) Physical
2) Chemical

Physical methods of disinfecting:

- Boiling - good bactericidal effect, but expensive method - the big power consumption - is applicable in domestic conditions.

- UVR - 100 % effect, but needs the big power consumption and small volumes of water - in clean water UV pass through only 50 sm, in muddy - is even less.

- Gamma irradiation - is used seldom - the complex equipment, threat of an irradiation of the personnel and the induced water radioactivity.

- A ultrasonic irradiation - complex

Chemical methods disinfecting of water:

- Ozonization - action of atomic oxygen - good bactericidal effect. The big power consumption. It is improved water organoleptics. Full destruction of toxic substances in water.
- Action ions of silver. «Sacred water» in churches. Ions of silver has bactericidal effect.

Chlorination water.

At entering chlorine in water there is a hydrolysis of chlorine and formation hydrochloric and chlorinewatic (HOCl) acids, dissociates to ions H + and ions OCl- bactericidal effect.

The scheme of chlorination:

90 % of chlorine contacts with various substances in water and inactivated (chlorine absorbing), there is residual or free chlorine - for sufficient bactericidal effect it should be 0,3-0,5 mg/l (below - there is no bactericidal effect, is higher - change a smell of water more than 2 points).

Chlorine absorbing + residual chlorine = chlorine necessity water.

It is determined at skilled chlorination - on practical lessons.

Kinds of chlorination water

On chlorine necessity or chlorination by normal dozes of chlorine - under the control contents of residual chlorine 0,3-0,5 mg/l.

For improvement bactericidal effect there are other kinds of chlorination:

1) Superchlorination - application big dozes of the chlorine exceeding chlorine necessity waters. It is used for very much polluted waters, unknown waters on bacteria indications (field conditions), on epidemic indications. Water then demands dechlorization - through the activated coal, hyposulfit.

2) Double chlorination - entering chlorine before and after water cleaning - is increased exposition action of chlorine, but formation toxic chlorine-organic substances raises.

3) Chlorination with ammonization - entering into water chlorine and ammonia - are formed chloramines - the greater bactericidal effect, there is no «chemist's» smell, as at usual chlorination when in water can be

Lacks water chlorination:

- Deterioration organoleptics (smell) of water.
- Not always reliable disinfecting (viruses of a hepatites).
- At pollution water at chlorination are formed toxic chlorine-organic substances such as chloroform, tetrachloretylen, having

General hygienic requirements to drinking water include the following:

- Good organoleptic properties
- Optimal natural mineral composition
- Toxicological safety
- Epidemiologic safety
- Water radioactivity – within the

Hygienic characteristics of water quality criteria

- **Organoleptic properties of water are divided into 2 subgroups:**

1) **Physical and organoleptic – combination of organoleptic characteristics that are perceived by sense organs and are evaluated according to the strength of perception**

2) **Chemical and organoleptic – content of particular chemical substances,**

Organoleptic criteria of drinking water quality

Criteria, units of measurement	Standards (maximum)	
	State Standard 2874-82	Sanitary rules and norms (SSRandN)
Physical and organoleptic		
Odour, points	2	2
Turbidity, mg/l	1.5	0.5 (1.5)
Spectral colour, degrees	20	20 (35)
Aftertaste, points	2	2
Chemical and organoleptic		
Hydrogen index, pH value, within the range, units.	6.0—9.0	6.5—8.5
Iron, mg/l	0.3 (1.0)	0.3
Total hardness, mg-equiv/l	7.0 (10.0)	7.0 (10.0)
Sulphates, mg/l	500	250 (500)
Solid residue (total mineralization), mg/l	1000 (1500)	1000 (1500)
Polyphosphate residue, mg/l	3.5	—
Chlorides, mg/l	350	250 (350)
Copper, mg/l	1.0	1.0
Manganese, mg/l	0.1	0.1
Zinc, mg/l	5.0	—
Chlorophenols, mg/l	—	0.0003

Toxicological criteria of drinking water chemical composition safety

Criteria	Standards (maximum), mg/l	
	State Standard 2874-82	Sanitary rules and norms (SSRandN)
Nonorganic components		
Aluminium	0.5	0.2 (0.5)
Barium	—	0.1
Beryllium	0.0002	—
Molybdenum	0.25	—
Arsenic	0.05	0.01
Polyacrylamide residue	2.0	—
Selenium	0.001	0.01
Lead	0.03	0.01
Strontium	7.0	—
Nickel	—	0.1
Nitrates	45.0	45.0
Fluorine: I—II climatic zone III climatic zone IV climatic zone	1.5 1.2 0.7	1.5
Organic components		
Trihalogenomethane(THM, sum)	—	0.1
Chloroform	—	0.06
Dibromochloromethane	—	0.01
Carbon tetrachloride	—	0.002
Pesticides (sum)	—	0.0001
Integral indices		
Permanganate oxidizability	—	4.0
Total organic carbon	—	3.0

Criteria of drinking water epidemic safety

Indices, units of measurement	Standards	
	State Standard 2874-82	Sanitary rules and norms (SSRandN)
Microbiological		
Amount of bacteria in 1 ml of water (total microbial number, TMN), CFU /ml	Maximum 100	Maximum 100
Amount of colibacillus group bacteria (coli-form microorganisms), i.e. CBGB index, CFU /l	Maximum 3	Maximum 3
Amount of thermostable colibacilli (fecal coli-forms), i.e. FC index, CFU /100 ml	—	Absence
Amount of pathogenic microorganisms, CFU /l	—	Absence
Amount of coli-phages, PFU /l	—	Absence
Parasitologic		
Amount of pathogenic intestinal protozoa (cells, cysts) in of water	—	Absence
Amount of intestinal helminths (cells, roes, larvae) in of water	—	Absence

Drinking water radiation safety criteria

Criteria	Standards (maximum), Bq/l	
	State Standard 2874-82	Sanitary rules and norms (SSanR&N)
Total activity concentration α-emitters	—	0.1
Total activity concentration β-emitters	—	1.0

Criteria of physiologic value of mineral composition

Criteria, units of measurement	Standards	
	State Standard 2874-82	Sanitary rules and norms (SSRandN)
Total mineralization, mg/l	—	from 100.0 to 1000.0
Total hardness, mg-equiv/l	—	from 1.5 to 7.0
Total alkalinity, mg-equiv/l	—	from 0.5 to 6.5
Magnesium, mg/l	—	from 10.0 to 80.0
Fluorine, mg/l	—	from 0.7 to 1.5

- **Odour** – is the ability of chemical substances to evaporate and, producing sensible steam pressure over water surface, to irritate receptors of mucous membranes of nose and paranasal sinuses, and in such a way to cause corresponding sense.

There is the following differentiation of odours: natural (aromatic, marshy, putrefactive, fishy, grassy), specific (pharmaceutical) and indeterminate odours.

- *Taste and aftertaste* — is the ability of chemical substances, existing in water, to irritate taste buds, which are placed on the surface of tongue/t surface, and to cause corresponding sense.

One can differentiate salty, bitter, sour and sweet tastes. The rest are aftertastes: alkaline,

To characterize the strength of odours, tastes and aftertastes of water there is a standard five-point scale:

0.	Odour (taste, aftertaste) is absent, it can not be detected even by experienced flavourist (taster)
I.	Very slight one, consumer can not detect it, but it can be detected by experienced flavourist (taster)
II.	Slight one, consumer can detect it only in case of drawing consumer's attention to it
III.	Perceptible one, consumer easily detects it and shows negative reaction
IV.	Distinct one, water is unusable
V.	Very intensive one, can be detected at a distance, so water is unusable

Smell and smack - up to 2 points.

- It is determined in the open and closed experiences in people. Scale:

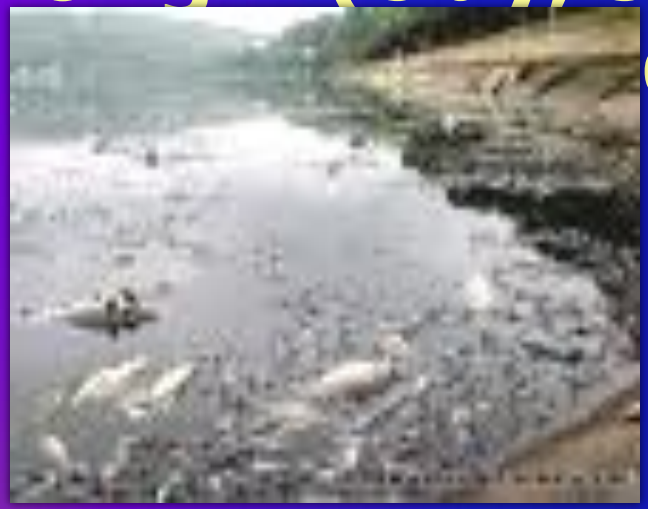
0.	Absence smell and smack
I.	Determines only odorator - the person with the increased sensitivity smells and tastes
II.	The consumer does not pay attention
III.	Appreciable – causes the negative attitude to water
IV.	Distinct - limits water consumption
V.	Very strong - water is unsuitable for drink

- **Colour** - is natural property of water, depends on humic substances, which are washed out from the soil during formation of surface and ground water reservoirs and give water yellow-brown tint.

Colouring or chromaticity of water - up to 20 degrees.

It is determined on a scale of ampoules with a chrom-cobalt solution with different color.

Suspended materials concentration(turbidity- is natural property of water that depends on the content of suspended substances of organic and nonorganic origin (clay, sludge, or, plankton).



Turbidy - up to 1,5 mg/l or transparency - 30 sm. It is determined with the help of special flasks – in norm must be opportunity reading the text through a layer of water in 30 sm.

greatly on:

- Organoleptic properties of water.

According to the international standard the temperature should not exceed 25°C, cool water with temperature (12–15°C) is considered to be the best water.

- Rate and intensity of water purification and disinfection processes at water supply stations.

Temperature – 12-15^{0}C. Below –

- **Solid residue (total salinity) — is the quantity of solutes, mainly mineral salts (90 %), in 1 litre of water.**

Water with solid residue up to 1000 mg/l is called fresh water, one with solid residue from 1000 to 3000 mg/l – saltish water, one with solid residue more than 3000 mg/l – salt water. Salinity of 300 — 500 mg/l is considered to be optimal. Use of such water is accompanied by increase of hydrophilia of tissues, water retention in body, decrease of diuresis by 30 — 60 %, in consequence of which, load on cardiovascular system increases, it can cause dyspepsia, it also causes aggressive clinical behaviour and serious clinical course of nephrolithiasis and cholelithiasis.

Saltish and salt water has unpleasant taste.

Hydrogen index (pH value) —within the range of 6.5 to 8.5.

- Change of water active reaction is the evidence of water supply source pollution with acidic or alkaline industrial sewage wate.

Determination of pH value.

- **Total hardness** — is the natural property of water that depends upon the presence of so-called salts of hardness, namely: calcium and magnesium (of sulphates, chlorides, carbonates, hydrocarbonates).

We differentiate general, reduced, constant and carbonate hardness.

$$Ca(HCO_3)_2 = CaCO_3 + H_2O + CO_2.$$

$$Mg(HCO_3)_2 = MgCO_3 + H_2O + CO_2$$

- Sudden change from soft water to hard water can cause dyspepsia. In regions with hot climate use of water with high hardness causes deterioration of urolithiasis clinical course.

- Water with hardness value more than 10 mg-equiv/l increases endemic goiter risk. High hardness causes dermatitis initiation

The contents chlorides – up to 350 mg/l.

Give to water salty smack - in the big concentration - change taste of water more than 2 points.

At increasing chlorides in water it is violations of water-electrolit exchange and function of kidneys.

«The Salt hypertension» - in areas with salty water arterial hypertension meets in 4 times more often.

At concentration chlorides more than 500 mg/l - oppression secretion and acidity of gastric juice.

It is the indirect parameter of organic

– The contents sulfates

– up to 500 mg / l.

Give to water bitter smack more than 2 points.

At increase - oppression gastric secretion, break intestinal absorbtion, can be reflex dyarrea.

Also it is indirect parameter organic pollution – many sulfates in faecal masses

Iron.

The contents iron - up to 0,3 mg/l.

$$4Fe(OH)_2 + 2H_2O + O_2 = 4Fe(OH)_3$$

Fe hydroxide (III) dissolves poorly and forms brown flocks in water that causes colour and concentration of suspended materials in water.

The contents fluorine –

0,7-1,5 mg/l (in hot climate it is possible 0,7 mg / l - use waters more, in cool - 1,5 mg/l).

- At the small content fluorine in water in people may be caries, at increased - fluorosis (spotty defeat dental enamel, infringement Ca-P exchange, fluoric cahexya, deformation and fragility bones).

- **Criteria of safety according to chemical composition – are indices of maximum allowable concentrations of chemical substances (MAC), which may have negative impact on people health causing progress of different dise**

- **Chemical substances of natural origin (beryllium, molybdenum, arsenic, lead, nitrates, fluorine, selenium, strontium) cause initiation of endemic diseases (endemic**

Chemical substances that come in water as a result of industrial, agricultural and domestic pollution of water supply sources.

They include heavy metals, detergents, pesticide, synthetic-base polymers.

Their concentration in water must be nonhazardous for the health of people and their descendants when they use such water permanently for the whole life.

Such concentrations we call

- **Criteria that characterize epidemic safety of water are subdivided into 2 subgroups**

the sanitary and microbiological criteria and the sanitary and chemical criteria.

Sanitary and microbiological criteria of epidemic safety of water

All over the world the following parameters microbe pollution of water are used:

1. Total number of microorganisms in water.

2. The contents intestinal stick (E.Coli) as constant inhabitant of sewage and relative steadier microbe, than others, to disinfecting water - shows efficiency of disinfecting water.

- **Total microbes number (TNM) - up to 100 in 1 ml** (amount microbe colonies at crop 1 ml of water at Petri's cup at 37°C in 24 hours).
- **Coli - index - up to 3 in 1 l.** Quantity intestinal sticks in 1 l waters.

Epidemiological value of water

Water factor plays the leading part in occurrence some infectious diseases

- Intestinal infections - belly typhus, cholera, paratyphus, dysentery
- Anthropozoonoses - brucellosis, tularemya, the Siberian ulcer, leptospirosis
- Virus - hepatitis, poliomyelitis, adenoviruses

Attributes of epidemiological danger of water:

- **Straight indexes** - deterioration bacteria parameters of water, presence pathogenic microbes

- **Indirect** - deterioration organoleptic parameters, growth chlorides, sulfates, nitrogenous substances.

Attributes of water epidemic (epidemic with water-way transmission):

1. Quick mass flash the same infectious diseases.
2. Territorial connection flash of diseases with the certain water source.
3. After realization antyepidemic measures in the center (prohibition using water source, disinfecting water) - sharp decrease amount of diseases, are registered only separate cases («epidemic tail»).
4. The hot season - better conditions for duplication activators, besides the person consumes a lot of liquid - is

Sanitary and chemical criteria of epidemic safety of water:

- Oxidability of water and biochemical consumption of oxygen (BCO).

The important parameter of amount of organic substances in water - for their oxidation is required more O_2. In norm oxidability of water - 2-4 mg O_2/l.

Dynamics oxidability for 5 or 20 day - BCO - criterion of oxygen mode of a reservoir - is studied at normalization pollutants in water of reservoirs.

Nitrogen substances (ammonia, nitrites, nitrates).

Ammonia and nitrites in water practically should not be, nitrates - up to 10 mg / l (in recalculation on nitrogen). As it is final parts disintegration proteins, on them it is possible to make prescription about organic pollution: if in water is only ammonia - fresh pollution, only nitrates - old, all nitrogenous substances - proceeding pollution. It is indirect parameter organic pollution of water.

At the increased contents nitrates and nitrites (the reason: organic pollution of reservoir or going in it nitric fertilizers) it is possible special illness - water-nitrate

- Sanitary inspection of centralized water supply is subdivided into preventive one a  .

- Preventive inspection includes sanitary examination of the design of water pipeline and all the components of water pipeline, supervision of the

is put into operation, the following sanitary protection zones are to be designated:

- **Strict regime zone, which includes the defined part of water area in the place of water intake and upstream, territory around the water-purifying facilities**
- **Restriction zone – the territory, where any construction and operation of facilities, which can pollute this territory and the water reservoir, is prohibited**
- **Survey zone, which includes the**

Sanitary regular inspection is exercised using methods of more detailed regular periodical inspection, sporadic one, even urgent sanitary inspection.

Such inspection is necessarily accompanied by water sampling and by the laboratory analysis of water.

Thanks for attention!