

2. Experimental

2.1. Sampling of drinking water from Almaty districts

A total of 16 drinking water samples were collected from 8 districts of Almaty. Samples were collected by sampling two samples from each district in glass containers with a volume of up to 2 L. Prior to water sampling, the containers were rinsed several times with the test water before filling, leaving some volume for the water to expand when heated, sealed tightly, and a label was attached indicating the sample number, place, and date of sampling.

2.2. Methods

Drinking water samples were prior filtered through the membrane (0.45 μm), and then 1:1 nitric acid was added. After appropriate dilution with nitric acid, an aliquot of each water sample was applied to analytical instruments for each analysis of the characteristics of water. Organoleptic characteristics of drinking water (smell, taste, color, and turbidity) were determined in accordance with Kazakhstan Standard methods GOST 2874-82 and SanPiN 2.1.4.559-96 [11, 12]. General characteristics: pH was determined by pH meter pH150MI (Russia), dry residue by gravimetric method by GOST 18164-72, total hardness and permanganate demand by titrimetric methods GOST 4151-72 and STRK 1498-2006 [11, 12]. Inorganic substances (cations and anions) were determined by capillary electrophoresisKapel-150M (Russia) with methods GOST 31869-2012 and PNDF 14.1:2:4.157-99, and heavy metals by atomic absorption spectrometer AgilentAADuo55B/240Z(USA) with method ST RK GOST R 51309-2003, and total petroleum hydrocarbons by nephelometric method on liquid analyzers "FLUORAT@-02-5M" with method PNDF 14.1:2:4.128-98 (Russia) [11, 12].

3. Results and discussion

3.1. Organoleptic characteristics of drinking water

Quality control of drinking water is associated with the analysis of different parameters, and organoleptic characteristics [2]. The organoleptic quality is defined as the result of evaluating water based on odor, taste, color, and turbidity. If the water has a taste or odor (or it is cloudy or colored), it

may be interpreted as a health risk and a problem in the water source, its treatment, or the water network.

3.2. Odor

The odor of drinking water can be natural and artificial origin. Odors of natural origin (aromatic, swampy, putrid, woody, etc.) are due to water chemistry, living organisms, decaying crop residues, algae consumption and emissions. Odors of artificial origin, characteristic of anthropogenic sources, are included in industrial wastewater. They are characterized by the composition of organic compounds, like organic acids, aldehydes, ketones, esters and some other compounds [12]. Quantitatively, the presence of odor is evaluated in points on a five-point scale (Table 1). The intensity of the odor of drinking water at 20 °C should not be more than 2 scores and tested by two people in order to avoid misinterpretation of results. The odor intensity of all drinking water samples taken was 0 scores on a five-point scale, i.e., there is no smell for all samples, and accordingly all water samples meet the requirements for drinking water quality of Kazakhstan sanitary norms [11, 12].

Table 1
Organoleptic properties of drinking water

Properties	Units	Max Permitted Levels, not more
Odor	Score	2 (0 to 5)
Taste	Score	2 (0 to 5)
Color	Degrees	20 (0 to 20)
Turbidity	mg/L	2.6

3.3. Taste

The taste of drinking water is characterized by the presence of natural compounds (compounds secreted by living organisms in the course of their vital activity) or anthropogenic origin, which can enter wastewater [12]. The quantitative intensity of the taste of drinking water is evaluated on a five-point scale. To determine the taste, water samples were taken into the mouth in small portions and kept in the mouth for 3–5 sec without swallowing. The quantitative intensity of taste is evaluated on a five-point scale and tested by two people in order to avoid misinterpretation of results. The intensity of the taste of drinking water should not exceed 2 points according to the Kazakhstan sanitary norms