

Ecoanalytical Monitoring of Natural Objects and the Role of Physico-Chemical Analysis in It

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Abstract: Protection of environment and nature is one of the main problems of today. In recent years, as a result of the construction of many industrial enterprises in densely populated countries, cities, and districts, and as a result of the increase in the number of technical means considered necessary for the needs of the population, the air of cities is becoming polluted, and the amount of harmful gases in it is increasing.

Keywords: atmosphere, pollution level, water, analysis, electrochemical analysis, ionometric analysis, sensitivity, selectivity.

Today, the presence of fogs, photochemical reaction products of hydrocarbons, nitrogen and nitrogen oxides in the atmosphere causes diseases in the respiratory organs. At this point, it is enough to say that in European countries and the USA, death from chronic bronchitis and asthma diseases increases twice every ten years. According to the information of the International Health Organization, three out of four cancer cases are related to environmental pollution. The use of herbicides, pesticides and other drugs used in agriculture threatens to increase the amount of harmful gases in the air and, as a result, various changes in the human body and even the birth of a healthy generation.

Air pollution causes the following consequences. Violation of air quality necessary for living organisms; Deterioration of human health and increase in types of diseases; As a result of acid rain, the destruction of construction structures with lime, marble, and metal coating; Climate warming as a result of increasing carbon dioxide (CO₂) (greenhouse effect); Climate cooling due to increasing sulfur oxide (SO₂) (increasing albedo of the earth); Depletion of the ozone layer as a result of freon gas entering the air;

Environmental pollution affects our lives in every way, the number of sunny days in cities decreases and plants die. However, the greatest risk of pollution is the possibility of the formation of unfavorable mutations in the human body as a result of the increase in chemical mutagens in the environment. As a result, the birth of mentally and physically underdeveloped children will increase, or even childlessness may occur in new families. In our age of advanced science and technology, it is known that in many countries, children die from congenital diseases more often than from infectious diseases. An increase in the amount of pollution in the atmosphere leads to a decrease in the yield of agricultural crops, the quality and growth of trees, and a decrease in the milk of dairy cows in agriculture and the hoof of cattle in general.

The continuous accumulation of carbon (II) oxide (CO) as a gas residue of vehicles poses a great danger in urban air pollution. As a result of the increase in the amount of CO in the atmosphere, light energy turns into heat energy, and causes various changes in the plant, animal and human organism. In the center of the city of Samarkand, the university avenue has been a witness of several generations and has delighted the eyes of visitors from all eras. Today, these hundred-year-old trees are living in a difficult ecological situation. It would not be wrong to say that about 50% of the vehicles moving in the city poison its surroundings with soot gas in one day. Anyone who observes can see that this alley, which was once a cool resting place, is covered with a layer of air in the form of bluish fog. According to the information provided by the International Conference on Weather, the increase in the amount of carbon (II) oxide can increase the temperature of the globe by 1.5-3 0C. Taking into account these facts, it is necessary to preserve such avenues, which will be inherited by future generations, as an urgent task of today's people. Therefore, if the officials of the city, region, and district solve such issues without hesitation, it would be possible to achieve partial cleanliness of the city's air.

The chemical industry together with the petrochemical industry produces ammonia, hydrogen sulfide, sulfur (IV) oxide, nitrogen (II) oxide, chlorine and fluorine compounds, formaldehyde, naphthalene, styrene, toluene, methanol, nitrate, phosphate, acetic and cyanide acids in the atmosphere. is really the main reason. 100 million tons of sulfur (IV) oxide are released into the atmosphere every year. Therefore, it should be noted that the main task of the current industry is to create waste-free technologies.

It is also possible to observe changes in the composition of soil and water from environmental objects [1]. It is known from the results of many years of experience that when the samples of water taken from the Siyob stream entering the city of Samarkand and leaving the city are examined using chemical, electrochemical and optical analysis methods, it can be observed that the amount of most of the ingredients in its composition has changed [2].

Chlorides, nitrates, and ammonium ions were measured using the ionometric analysis method, which has higher sensitivity and selectivity than electrochemical analysis methods. The main function depends on the sensitivity of ion-selective electrodes. In all cases, a silver chloride auxiliary electrode was used as the reference electrode. The amount of sulfates in wastewater was determined using chemical analysis methods.

The following tables show the results of quantitative analysis of wastewater samples taken from the beginning of the Siyob stream and the exit from the city of Samarkand.

Table 1. Quantitative analysis results of water samples taken from the beginning of the Siyob stream (Samarkand district).

n=3; $\bar{p}=0,95$; $\bar{t}_{pf}=4,30$; 2023 y. February.

| № | Ingredients | \bar{x} | S | Sr % | $\Delta \bar{x}$ |
|---|----------------------|-----------|-------|------|------------------|
| 1 | pH | 7.30 | 0.016 | 0.22 | 0.040 |
| 2 | Hardness, mg-ekv/l | 6.51 | 0.080 | 1.23 | 0.199 |
| 3 | Suspended substances | 38.1 | 1.028 | 1.27 | 0.594 |
| 4 | Dry residue | 524 | 7.388 | 1.41 | 18.36 |
| 5 | Ammonium ions, mg/l | 0.71 | 0.002 | 0.26 | 0.004 |
| 6 | Nitrates, mg/l | 3.72 | 0.015 | 0.42 | 0.039 |
| 7 | Chlorides, mg/l | 44.3 | 1.595 | 0.36 | 3.964 |
| 8 | Sulfates, mg/l | 45.1 | 0.690 | 1.53 | 1.715 |

Table 2. Quantitative analysis results of water samples taken from the outlet of Siyob stream (Chakka village).

n=3; $\bar{p}=0,95$; $\bar{t}_{p,f}=4,30$; 2023 y. Fevral.

| № | Ingredients | \bar{x} | S | Sr % | $\Delta \bar{x}$ |
|---|----------------------|-----------|-------|------|------------------|
| 1 | pH | 7.41 | 0.017 | 0.24 | 0.044 |
| 2 | Hardness, mg-ekv/l | 6.19 | 0.078 | 1.26 | 0.194 |
| 3 | Suspended substances | 57.2 | 0.932 | 1.63 | 2.317 |
| 4 | Dry residue | 418 | 5.392 | 1.29 | 13.40 |
| 5 | Ammonium ions, mg/l | 2.53 | 0.008 | 0.32 | 0.020 |
| 6 | Nitrates, mg/l | 5.67 | 0.029 | 0.51 | 0.072 |
| 7 | Chlorides, mg/l | 41.4 | 0.136 | 0.33 | 0.339 |
| 8 | Sulfates, mg/l | 79.2 | 1.125 | 1.42 | 2.795 |

The differences between the ingredients of the wastewater samples taken from the inlet and outlet of the Siyob stream: pH 0.11; hardness 0.32 mg-eq/l; suspended substances 19.1; dry residue 106; ammonium ions 1.82 mg/l; nitrates 1.95 mg/l; chlorides 2.9 mg/l; it can be seen that sulfates were the highest at 34.1 mg/l. When the results of the quantitative analysis are processed metrologically, it can be seen that the value of the reliability interval of the analysis is 0.004-18.36 and 0.020-13.40, and this result confirms the accuracy of the analysis.

From the results of the quantitative analysis of the ingredients in the wastewater, which are considered objects of ecological analysis, it can be seen that the increase in the amount of these ingredients when leaving the city may be due to the fact that the treatment facilities of the industrial enterprises in the city are not being used sufficiently [3]. In addition, the pollution of the Siyob stream is caused by various wastes thrown out by the city residents, of course.

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