Some Expected Changes Caused as a Result of Modern Scientific – Technical Processes in the Atmospheric Air

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Abstract:

Atmospheric air is practically inexhaustible natural resource, but in modern epoch, as a result of the human’s economic activity it is polluted and the intensity of pollution is increased more and more. In recent years, as a result of the growth of the fuel amount of the vehicles, the propagation of carbon monoxide, hydro carbon, nitrogen and sulfur acids, soot, and carbon dioxide is also increased in the atmosphere. The observation on air in Georgia takes place only in five towns – Tbilisi, Kutaisi, Batumi, Zestaponi and Rustavi. One observation station is located in Batumi on the territory of port. The lack of observation stations does not enable us to estimate the air quality on the territories of even the abovementioned towns thoroughly, in all five towns, the air quality are not correspondent to the admitted norms, due to which the problem of atmospheric air protection is still in the agenda.

Key Terms: air, pollution, transport, hydrocarbons, oxides, soot

Introduction:

The economic and scientific - technical progress in the world of nature caused the irresponsible attitude, which led to the degradation of our planet’s ecological condition. As a result of the sharp deterioration of the environment, the number of harmful substances in gradually increased the atmosphere, the quality of water and soil purity worsened, the number of harmful substances in food products exceeded the maximum permissible concentration, resulting in a threat to human health.

Materials and Methods:

Visual method of determining the number of acid with titration in rain water. Rainwater, 0,1 N KOH - the solution, mixture of toluene-alcohol (1:1)

Results and Discussion:

Modern atmosphere developed along with the development of life, it regulates the solar energy fallen on earth. Otherwise, the sun would heat the earth’s surface up to 100 °C° daytime, and at night the temperature would fall up to minus 100 °C°. The circulation of oxygen, carbon, nitrogen, water and other substances is related to atmosphere. The air space serves as a giant reservoir, where substances are collected and distributed at the same time on the whole earth. During the last 100-150 years, some changes have been observed in the atmosphere. This applies to the main components of the atmosphere and their sources. About 1·10¹⁰ tons of oxygen is burnt on our planet every year. During last centuries, almost the same amount of oxygen is used, as in the last million years. This amounts to approximately 0.02% of supply. It is supposed that if the process is continued, after 100-150 years the oxygen consistency will be reduced to 1.5-2%. Another problem is also related to atmosphere – intensive emission of carbon dioxide. Its content in the atmosphere is 0.03% - not over, but it is believed that in the first half of the XXI century - the mount of CO₂ will increase up to 0.04%. At first glance, such a change should not be alarming, because the CO₂-concentration improves the lifetime of the plant, but the carbon dioxide concentration in the atmosphere will cause visual change in transparency and complicates the thermal radiation reflected off the surface of the earth, and most importantly, the temperature increase of the atmosphere. The latter, in turn, will cause ocean levels rise and flooding of Ocean countries.

The ¾ of the volume of air is nitrogen. Its amount is more - or less balanced thanks to nitrogen fixing microorganisms, water plants and denitrificator bacteria, but the industrial use of nitrogen could significantly alter the
balance. They suppose that billions of tons of nitrogen are spent for industrial purposes in a year, i.e., several times more than denitrificators generate. The question arises - in the field of human activity, which field leads to the emission of a particular species? Why do gas additives cause such a great diversity of atmospheric effects? But the complete answers to this question are not yet issued (Kajaia 2008).

The 2/3 of oxygen supply in the atmosphere will be over in the next 180 years. Every year, hundreds of millions of tons of polluting substances are mixed with the atmosphere, much of which comes from stationary electric devices and means of transportation. It is known that the average capacity of one car in every 1,000 km spends almost annual norm of the oxygen needed for one person. The scales of harmful effects of this kind of transport are easily understandable, considering that the number of vehicles is growing rapidly and continuously (Alasania et al. 2011).

The negative side effects of the atmosphere are associated with the increase of concentration of some of the secondary components... To the number of such components belong SO$_2$, its content in the atmosphere is rarely 1/50 billion - but these are enough to such negative events, such as acid rain, stone and metal corrosion, low visibility, destruction of vegetation, etc. Sulfur dioxide enters the atmosphere during sulfur-containing fuel combustion. The main source is oil or coal-fired power plants, boilers, metallurgical industries, as well as diesel-powered vehicles. Allowed for the existence of high concentrations of sulfur dioxide in the air irritates the upper respiratory tract. Adverse impacts are visualized on the nose and throat areas, on tracheal mucosa. To the second quality components belongs NO$_2$, the concentration of which is also low, but it plays an important role in acid precipitation and production of smoke and mist. Nitrogen acids are formed at very high temperature and excess oxygen during the combustion of the fuel. The main sources are automotive exhaust, soot, thermal power plant emissions, and gross waste generated during the combustion fumes.

As a result of transformation of sulfur and nitrogen oxides into the atmosphere acid rain is formed. Basically these substances while interacting with the atmospheric damp are transformed into acids and increase the acidity of rain water. The scales of generating acid rains and their impact on animate and inanimate environment are considered to be a global ecological problem. Ecological threat is not only the acid rain, but the processes, one of the most serious effects on forests and soils are as a result of acid rains. The food substances are washed out from the soil by the effect of acid rain, in parallel, the toxic substances turn from the insoluble to soluble condition, and therefore they are absorbed by the plant’s root system, and this will cause the plant dying. One of the main reasons of drying forests is considered to be the increased acidity of the soil. Besides, acid rains cause a global range of negative outcomes: increasing soil acidity and the fertility decline, an increase in the acidity of water, death of flora and fauna; death and destruction of many species of animals, corrosion acceleration of bridges, buildings, metallic structures, wiring and so on, the damage world culture monuments, adverse effects on human health.

Table 1. The change the number of acidity in rain water according the season. (mg / g)

<table>
<thead>
<tr>
<th>Sampling period</th>
<th>Interval change in the number of acid rain water</th>
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<tbody>
<tr>
<td>Autumn</td>
<td>5–10,3</td>
</tr>
<tr>
<td>Winter</td>
<td>6,6–10,4</td>
</tr>
<tr>
<td>Spring</td>
<td>6,6–20,6</td>
</tr>
<tr>
<td>Summer</td>
<td>5–6,6</td>
</tr>
</tbody>
</table>

The table below shows the change the number of acidity in rain water according the season in Batumi. Interval change in the number of acid in rain water is ions (Cl$^-$, SO$_4^{2-}$, HCO$_3^-$) sum. As the table shows, the sum of these ions concentration is high in autumn, winter and spring period. And it is low in summer.

The atmospheric air condition on the territory of Georgia is regulated by the Law “On Protection of Atmospheric Air”.

The basic polluters of the country’s atmosphere are transport, industrial facilities, and energy and agriculture sectors (Turkadze and Butskhrikidze 2008).
The basic polluter of the urban environment is transport. It should be noted that in recent years, the number of vehicles and the fuel consumed by them increase. Consequently, the emission of harmful substances into the atmosphere in these sectors also increases. The atmospheric air from the transport is basically polluted by carbon monoxide, hydrocarbons (volatile organic compounds and small amounts of methane), nitrogen acids, sulfur dioxide, soot, benzpyrene and carbon dioxide. Consequently, these pollutants are emitted where the traffic is high - the big cities, the transit route. Vehicle emission intensity depends on many factors, including the average age of cars and their emissions standards on cars and their emissions on a regular technical inspection; on fuel quality standards, different shares of motor vehicle fuel; traffic flow management, i.e., how frequent traffic jams and other delays are; human consciousness. In Georgia, public transport is still poorly developed, which is one of the reasons that the vast majority of people use small cars. Consequently, the number of vehicles is very rapidly increasing, but most of them are second-hand cars that are in the European, American and Japanese market oriented. The average age of vehicles in Georgia is 10-15 years. Diesel-powered vehicles are very popular. Vehicle maintenance checkup in the country has been stopped at this point; so many faulty vehicles are moving on the roads. Periodic inspection of motor vehicle emissions have been stopped as well; in current fuel conditions, the exhaust treatment device (converter) is quickly out of order, and it is expensive at the same time, which is why drivers refuse to change, and generally, takes it away from the car. So far, there is no end of good traffic management - frequent transport traffic jams take place every day. All of this leads Georgia in the transport sector with high emission. The air pollution was observed in five cities in Georgia nowadays, via seven monitoring stations placed in Tbilisi, Kutaisi, Batumi, Rustavi and Zestaponi. All five of the cities’ air quality does not meet acceptable standards. Lack of monitoring stations will not allow you to fully assess the air quality even on the whole territory of these five cities (.http://soegeorgia.blogspot.com).

There is one observation station in the vicinity of the port. As it is registered, in the gas and liquid emissions of harmful substances of the atmosphere 78.8% is carbon dioxide, 0.14% - sulfur anhydride, 0.13% - nitrogen acids, 14.5% hydrocarbons, and 0.27% - carbon monoxide and 6.16% - other substances. 41.8% of the total emissions of harmful substances in the air basin come on Ltd “Batumi Oil Terminal”. Among them, sulfuric anhydride 0.18%, 0.19% acid nitrogen, 0.22% carbon monoxide, 32.6% hydrocarbons, 66.04% carbon dioxide. Only 2.5% of harmful substances from stationary sources has been caught and neutralized (http://garemo-adjara.gov.ge). At present, in the world a great attention is paid to the protection of atmospheric air pollution from anthropogenic activities, because the air is essential for vital human resource. Person breaths 16 kg of air per day, which is five times more than the food consumed.

**Conclusions:** This figure indicates the low efficiency of the work of installation of gas and dust, or their non-existence, which negatively effects on the environmental quality indicator. Doses, which have been observed in the atmospheric air of this small town is not deadly, but it is more than acceptable. As you can see from the above, the prediction is very suggestive and in this regard, important measures are necessary in the issues of air quality protection.

**References**

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