

CHEMISTRY

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Possibilities of Using Environmental Knowledge in the Process of Environmental Protection

Abstract

In the globalising world, scientific and technical progress, increase in production areas, industrial and economic development have positively affected society and human life, but have caused serious deterioration of the ecological balance. Every person working in any field should have ecological culture and ecological knowledge. Since chemistry is mostly related to ecology among the subjects taught, the role of chemical production and anthropogenic effects in disrupting the ecological balance is great. In chemistry teaching, importance should be given to providing students with the necessary knowledge and skills about the source of environmental problems, environmental concepts, causes of problems and ways to eliminate them.

Keywords: *environmental education, chemical industry, anthropogenic effects, harmful substances, sulphur gas, nitrates, acid rain, environmental literacy, environmental education*

Introduction

The rapid advancement of science and technology has greatly affected humanity and the environment. Humans have had very serious effects on the environment without realising it. The level of pollution of the atmosphere, water and soil by various chemical products, including industrial, domestic and agricultural waste, is increasing rapidly. Such a question has arisen before humanity: What is the way out of the global environmental crisis?

Ecological Literacy, Culture and Ecological Consciousness

The highest stage of the ecologisation of consciousness is ecological culture, understood as the totality of the skills of contact with the natural environment. The existence of man and society requires the formation and observance of at least a minimum ecological culture. Humans are already facing very serious environmental problems. In order to eliminate such a problem, important processes such as ecological literacy and ecological culture should be brought to the agenda. Therefore, this can be achieved by increasing the role of environmental education throughout the entire educational process (Abbasov, 2004, pp. 36-43; Aliyev, 1987, pp. 20-25).

Research

If we look at the educational, educational and developmental functions of teacher activity, which is one of the main and priority topics of chemistry teaching methodology, we can show that the educational function is an aspect of special interest. It also connects several other parts. The educational function includes:

- to provide students with a scientific perspective,
- job training for students,
- cultivating love for the Motherland in students,
- environmental education in students.

Ecological culture is one of the manifestations of general culture. Unlike natural phenomena that arise spontaneously, culture is a product of human activity. Ecological culture, as one of the manifestations of culture in general, covers the sphere of relations between man, society and nature. We are talking about relations that reflect the positive beginning of human activity, aimed at harmonising the interests of man, society and the possibilities of nature.

The elimination of the ecological crisis is possible only on the basis of ecological culture, whose main idea is to promote the harmonious development of nature and man.

The formation of the ecological culture of young people takes place mainly at school. This is done by educating schoolchildren in the spirit of respect for nature, scientific and ecological understanding of the world landscape (Mammadova, 1985, pp. 30-32; Guliyev, 1998).

The main indicators of ecological culture are:

- knowing the general laws of development of nature and society,
- lack of consumer attitude towards nature,
- the ability to predict the consequences of the impact of human activity on the Earth's biosphere,
- to treat the environment with care.

Environmental education is a consciously organised, planned and systematic process for the acquisition of environmental knowledge and skills. Environmental education aims to help people to create a new environmental awareness in modern conditions, to learn values, professional knowledge and skills that will help the country and the world overcome the ecological crisis and to guide society towards sustainable development.

Environmental education can be considered as a necessary element of general secondary education of young people, because:

- school is the main place of environmental education of young people,
- the study of the scientific foundations of nature conservation at school allows the whole young generation of the country to acquire ecological culture.

Environmental education of schoolchildren is currently one of the priority areas of work with young people. The scientific organisation of the process of ecological education requires the precise determination of all its links, the distinction of connections and dependencies.

Environmental education and environmental education are sometimes confused concepts. Some people think that the more people know about nature, the more consciously they will protect it. Knowing nature is a necessary sign, but not sufficient. Having knowledge about a subject does not always determine the attitude towards that subject. The school should also be concerned with the timely training of students in environmental activities.

Ecological education is not only the acquisition of ecological knowledge. Environmental education, which is the acquisition of a special ecological ethics, the ethics of human relations with nature, is more important. At the same time, ecological morality and ecological ethics are essentially one of the deep humanistic elements of personality (Streltsova, 1985; Nazarenko, 1992, pp. 40-45).

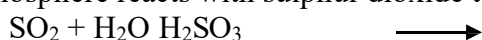
Ecological education is one of the new directions in pedagogy, which differs from the traditionally established "acquaintance of children with nature". Environmental education is the formation of children's environmental knowledge, thinking, feelings, will as a set of emotions and active preparation for the protection of the environment. As a result, environmental education is an important component of personality, which helps students to understand the surrounding reality as a place of residence and aesthetic perfection and is directed towards them (Abbasov, 2004, pp. 36-43).

The following organisational forms, methods and tools of ecological education are distinguished (Abbaszade, 2021, pp. 47-51; Ecological aspects of chemistry teaching at school):

- a) traditional,
 - b) active, innovative.
- lessons in the traditional format (introductory lessons, thematic lessons, lecture lessons, conversation lessons, etc.),
 - special lessons (independent work of students, discussion teaching method, role-playing games),
 - extracurricular and extra-curricular activities (research method, experience, solution of environmental problems),
 - elective courses, lectures, lessons, stories, watching films,

- various types of excursions (Ismayilova & Mammadov, 2018, pp. 24-29; Ways of teaching environmental knowledge in the process of chemistry teaching, 1985; Nasirova, 2011, p. 121).

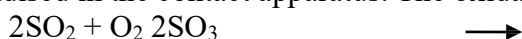
The use of mineral fertilisers in agriculture above the permitted concentration has a direct impact on the food products grown. If the amount of nitrates and other elements in fruits and vegetables exceeds the recommended limit, it causes a dangerous situation for the human body. Nitrates are well absorbed by plant roots. In addition, the conversion of nitrates into amino acids is carried out in chain reactions occurring in plants. As a result of this process, protein is formed. Life without protein is unthinkable and life without protein is unthinkable. When excessive amounts of nitrate are used in agriculture, the excess nitrate accumulates in the organs in such a way that it cannot be absorbed and causes intestinal diseases in the form of dangerous substances for humans. In addition, when divalent iron oxidises into trivalent iron, it also affects haemoglobin and the ability of haemoglobin to carry oxygen is impaired. For this reason, the amount of nitrate in fruits and vegetables, i.e. whether it is normal or not, should be checked regularly. More than 120,000 tonnes of sulphur dioxide are emitted into the atmosphere during the year and water vapour in the atmosphere reacts with sulphur dioxide to form sulphuric acid.



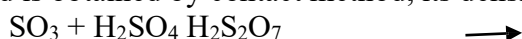
Dissolved oxygen in the water vapour oxidises with sulphuric acid to form sulphuric acid.

Once in the atmosphere, these compounds are carried thousands of kilometres away by the wind and fall to the ground as fog, rain and snow. Acid rain turns rivers and lakes into “dead” puddles and harms all living things there, from forests to fish to microorganisms. Although acid rain does not cause global warming and ozone depletion, its polluting effect can go far beyond national borders. In order to purify the gas mixture from arsenic, selenium and other toxic gases, it must be burned with water. In this cleaning method, the water itself is contaminated with toxic substances. Such contaminated water poses an environmental hazard when released into water bodies without treatment. It is therefore necessary to purify such water from toxic substances such as arsenic, nickel, cobalt and mercury. A special water purifier is used for this.

Pyrite is used as the main raw material in the sulphuric acid production process. The production of sulphur dioxide from the combustion of sulphur ores, hydrogen sulphide and sulphur is the first step in sulphuric acid production. In the next stage, the sulphur gas obtained as a result of combustion is purified from mixtures. The gas purified from dust with special electrolytes is oxidised in the contact apparatus. The oxidation process is carried out at 4500 °C.



SO₃ dissolved in solid H₂SO₄ is converted to oleum in the absorption tower. When sulphuric acid is obtained by contact method, its density is 93,4 %.



The part of the Earth consisting of gases is the atmosphere. The atmosphere is the layer of air that surrounds the earth. The word ‘atmosphere’ literally means “breathing sphere”. Its history has been researched since ancient times. The atmosphere is a thin layer of air covering the earth's surface and has very important properties.

For a biologist, an important characteristic of the atmosphere is that it supports various forms of life. For a chemist, the atmosphere is a place where continuous photochemical processes take place on a large scale.

One of the phenomena that complicate living conditions on Earth is the pollution of the atmospheric environment by anthropogenic wastes and their products. As we know, toxic substances are increasing in the environment and transport plays a major role in the increase of such substances, as the chemicals used in transport cause pollution by spreading around with the wind. The increase in the concentration of carbon dioxide in the atmosphere and the change in the ozone layer are the result of the effects on the atmosphere. Atmosferin heterogen təbiətli olması onun əsas xüsusiyyətlərindən biridir.

In atmospheric chemistry, water is extremely important in almost all phase states. It is known that the main participant in gas phase reactions is the hydrogen group and that the oxidising agent in reactions between liquid components is hydrogen peroxide and that the natural source of these

substances is water. The study of heterogeneous chemical processes is of decisive importance for clarifying the features of the formation of the biogeochemical cycle in the atmosphere. The effects of anthropogenic influences on climate are diverse and numerous. Anthropogenic effects on climate are based on chemical and physical transformations, determining the role of heterogeneous processes, explaining the relationship between these processes, determining the rate of gas phase reactions.

The composition of the atmosphere is determined by the processes occurring in the biosphere. In the biosphere organic substances are continuously synthesised and their decomposition processes take place. The stability of the chemical composition of the environment is ensured by the closed circulation of substances in the biosphere.

The following areas are relevant to the demand for this factor:

- 1) Impact of industrial development on the biosphere,
- 2) Explanation of the regularity process of the carbon cycle,
- 3) By developing climate theory.

Aerosols have a major impact on climate change. Atmospheric aerosol is a product of complex physical and chemical processes. The reason why the chemical composition and physical quantities of aerosol change is the complexity of these processes as well as the short lifetime of the aerosol.

There are the following types of natural aerosols according to source and composition:

- 1) Products from volcanic eruptions,
- 2) Products obtained from evaporation of sea water,
- 3) Fumes during combustion,
- 4) Products from reactions in the natural gas phase,
- 5) Mineral dusts that can be discharged into the atmosphere by wind.

There is another type of aerosol other than these types of aerosol, which is anthropogenic aerosol.

Conclusion

In addition to the main components, atmospheric air may also contain the necessary amount of substances released from natural sources. Plants, sea salt and water vapour particles, dust generated during soil erosion, gases generated during forest fires and volcanoes are attributed.

The composition of air consists of different gases. These gases include nitrogen, rhodium, argon, oxygen, etc. belong. However, it is not possible to find air with such a composition in nature. The gaseous medium of air contains a large amount of small liquid and solid particles. Air is in the form of a dispersed or aerosol system. These air pollutants enter the air through the biosphere. When air interacts with other components of the biosphere, namely water, soil and living organisms, it forms liquid and solid particles in the biosphere. Part of the biosphere is air (Ecological aspects of chemistry teaching at school).

A number of natural processes occurring in nature are the suppliers of air with dispersed particles. When a powerful volcano erupts, tiny solid and liquid particles rise into the air. These particles and the accompanying gases, which can remain in the air for weeks, rise to heights of 20 kilometres or more (Taghiyev, 2018).

In fires that occur in many countries every year, crushed solid smoke particles can spread over tens or hundreds of kilometres. Steppe and peat fires can produce mineral dust. During soil erosion and associated sandstorms, fine particles are released into the air when rocks are eroded and crushed.

There are industries that need to be considered among the factors that pollute the atmosphere more in relation to chemical production. In the process of providing students with environmental culture and environmental literacy, the teacher who teaches chemistry should definitely bring the appropriate links to the attention of the students.

These industries artificially pollute the atmosphere. These are the following:

1. Black metallurgy.
2. Chemical and petrol-chemical industry.

3. Building materials industry.
4. Thermal power plants.
5. Air pollution of transport waste etc.

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