CHAPTER 30

PROBLEM OF MICROELEMENTOZE AND TECHNOLOGY ALLOWING ITS ELIMINATION WITH THE HELP OF GEOTHERMAL MINERALIZED SOURCES: NEW TECHNOLOGY OF MICROELENTOZE ELIMINATION

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Abstract: The purpose of this leaflet is to give information on ways of manufacturing of mineralized specifically concentrated waters from natural waters containing valuable mineral substances and possessing, in particular, high physiological value, in order to eliminate iodine deficiency.

Keywords: biosphere endemism; anthropogenic intervention; synergy; iodine deficiency; fractions; enrich; brome

Introduction

Research of microelementoze distribution and its elimination are major problems for the prognosis and treatment of flora and fauna condition of the chosen site of the Earth (Norkulova et al., 2003; Norkulova, 2002). In this respect Central Asia is an original area for study of many features, as it is remote enough from sea coast and is by itself an example of biosphere endemism of the Earth. Many processes on a background of influence of anthropogenic intervention have the special parameters in such ecosystems. It is necessary to study these processes on the basis of applied scientific and practical works with further distribution of certain recommendations.

In 2004 in the Tashkent state technical university the Republican scientific and practical conference on a theme "Technosphere, man and microelements " was held. The results of the conference have shown that only combining of efforts and integrated recommendations can target the main directions of practical measures on ecosystems improvement (Norkulova, 2005). These issues can be solved with the help of modern technologies. The

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reasonable strategy constructed on the basis of various directions of synergy is necessary. As an example, we shall consider a problem of iodine deficiency. During many millions of years water carries away with itself iodine and other microelements to the bottom levels of the Earth, from mountains to lowlands and reservoirs, that is, continuously the level of iodine concentration at ocean raises, and on the huge territories of land reduces.

On Iodine Deficiency in Central Asia

The mankind began to notice iodine deficiency of the population and domestic animals, therefore the methods of elimination of iodine deficiency have appeared. For the necessary sites of the Earth to give maximal flourishing of life the normalization in distribution of microelements (ME), in particular, iodine, is necessary.

Despite of the problem of iodine deficiency in the region, there are huge stocks of underground sources of iodine and other substances, which joining ME circulation, can improve the condition of Central Asia ecosystem. Search and strategy of optimum methods of scientific development, supervision, and conclusions of research works allow finding practically implemented variants for ecosystem treatment. The merge of ecology, technology, hydrogeology, medicine, botany, and other disciplines on the basis of scientific development opens new opportunities of ecology development.

Models of Microelements Migrations

The models of microelements migrations in closed ecosystems are analog of the nonlinear cooperative phenomena in self-developing systems, where "slow" and "fast" dynamic variables participate. Here we notice anthropogenic intervention, measured during tens of years, and also parallel natural processes lasting hundred millions years. The partial management of ME condition in eco-chain allows to organize the relatively balanced levels of concentration at the expense of dynamic accumulation in the peak of a pyramid.

The microelements consumed by the people and fauna as a result of circulation of substances, get into the structure of ground, water, and through them into flora, partially coming back. If their leaving part comes back, in eco-chain the necessary level of ME concentration is supported at the expense of controlled anthropogenic ME balancing.

The system of self-development in the distribution of ME ecosystem at anthropogenic influence starts deviating from that picture of independent ecosystem generated by conditions of the wild nature.

The anthropogenic intervention slowly changes the picture of distribution and acts as a small dynamic variable of the external background. At certain

approximations, it is possible to present evolution of concentration in the chosen object j of that ME on the background of other microelement communities which are taking place in the given ecosystem, that is

$$\frac{\partial n}{\partial t} j = \hat{L}\left(n_j, n_k, f_i, f_k, t, \vec{x}\right), \tag{1}$$

where

$\hat{L}$ is a certain nonlinear differential operator

t is the time measured by years

$\vec{x} = \vec{x}(x, y, z)$ are coordinates

f_i is the function of the influence of an anthropogenic origin.

If we shall set a kind of function or $f_j - (t, \vec{x})$ equation of return dependence, that is

$$\frac{\partial f_j}{\partial t} = \hat{G}\left(n_j, n_k, t, \vec{x}\right), \tag{2}$$

where $\hat{G}$ is a nonlinear operator, then in view of boundary and entry conditions we shall receive a system for researching the nonlinear cooperative phenomena, that is, one of the most interesting analytical tasks of synergy.

In many regions, under ground, on the depth of 2–3 km there are geothermal waters, in which spectrum and concentration by dissolved microelements sometimes exceed the usual sea water.

New Method for Enriching Specifically the Chosen Objects

We have developed and patented a method allowing to enrich specifically the chosen objects and to receive ME concentration as pastes, and mineral water with fine solid salt fractions. The offered way concerns the manufacture of mineralized specifically concentrated waters from natural waters containing valuable mineral substances and possessing, in particular, high physiological value. So, in the course of concentration the offered minitechnology allows to receive some fractions of various salts. The application of special methods of cooling and dehydration of the oversaturated complex solutions of salts allowed dividing them into fractions, in particular, at the expense of differentiation on groups the concentrates enriched by brome, and also by iodine from iodine–brome sources have been obtained.

According to numerous scientific sources, Uzbekistan has mineral waters of various chemical compositions from more than 1,600 deep chinks. This circumstance offered by authors for using to develop the mineral waters resources. The put task is solved so, that obtained by the authors

mineralized highly concentrated water at general common mineralization 420,000–460,000 mg/dm^3 contains Na-cations and Ca − 40,000–50,000 mg/dm^3, magnesium cations − 26,000–30,500 mg/dm^3, calcium cations − 68,000–80,000 mg/dm^3, hydrocarbonates − 60–75 mg/dm^3, sulfates − 90–110 mg/dm^3, anions of chlorine − 260,000–300,000 mg/dm^3, anions of iodine − 450–550 mg/dm^3, anions of brome − 250–350 mg/dm^3.

The concentrate of mineral water obtained by the authors contains micro-elements in the tied condition. On organoleptic parameters the concentrate represents a colorless transparent liquid without a smell, with some natural sediment of mineral substances and taste characteristic for a complex of the dissolved substances. When mixed with water the concentrate is quickly dissolved and does not form the solid sediment that allows expanding the assortment of iodine containing products on its basis.

References

Norkulova K.T., Mamatkulov M.M., 2003. Dynamics of crystallization in vacuum–evaporation systems. *Newsletter of TSTU*, No. 2, pp. 11–13.

Norkulova K.T., 2002. Scientific and technical engineering with the purpose of prevention of iodine-deficiency in Central Asia, 2002. *«NATO Conference» Integration of s&t system of the Central Asian republics to the western world*, May 16–18, Ankara, Turkey.

Norkulova K.T., 2005. On some mechanical ways improving heat exchange in barometric chambers. *Urgent problems of the mechanics and mechanical engineering: proceedings of the international conference*, Volume II, Almaty, pp 120–123.