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STUDY OF PHYSICOCHEMICAL PROPERTIES OF WATER SYSTEMS IN KAZAKHSTAN

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Hydrochemistry was emerged as a science that studies the chemical composition of natural waters and regularities of its changes under the influence of physical, chemical and biological impacts. However, classical works on hydrochemistry mainly are devoted to the study of regularities of change in the composition of natural waters. processes of formation and quality of natural waters composition is still insufficiently studied.

Physico-chemical basis of the formation of the natural waters composition is the distribution of the components between the main phases - the true solution, colloids, suspensions, which are in the water mass and sediment as well as biota. Equilibrium and kinetic parameters are allocated to characterize these processes. The total process of equilibrium between the phases of macroscopic (advection, dispersion), diffusion and chemical kinetics for the heterophase component is called dynamics.



Bataeva G.O. etc.

The name of Beremzhanova B.A. - an eminent scientist in the field of inorganic chemistry and hydrochemistry - is associated with the development of the continental salt formation theory. B.A. Beremzhanov left a great legacy in science that is successfully developing by his numerous students at the present time. Chemists who have made invaluable contributions to the development and establishment of hydrochemical science in Kazakhstan are the following scientists-chemists, graduates of KazNU named after Al - Farabi: Snegireva N.E., Ibragimova M.A., Tokseitov H.K., Kruchenko S.S., Chirkova G.D., Romanova S.M., Taranina G.V., Kunanbayeva G.S., Kazangapova N.B., Range of creative interests of Beremzhanova B.A. is unusually broad: besides the applied research on the practical use of natural salts, there is extensive theoretical work on the study of the continental salt genesis. This enormous work, during which were investigated waters of the Lake Balkhash, Alakol, 100 salt lakes, 15 rivers and 39 inflows culminated in the establishment of the theory of continental salt formation. The work results were generalized in Beremzhanov B.A. doctoral dissertation (1967) "Physico - Chemical of processes of

Balkhash region salts formation and their use", which was the major contribution to science.

Under the chemical composition of natural waters is understood the whole complicated complex of mineral and organic substances in various forms of ion-molecular and colloidal state. With a certain conventionality the chemical composition of natural waters can be divided into the following five groups:

1. Major ions – (the content in the largest amount of Cl^- , SO_4^{2-} , HCO_3^- , CO_3^{2-} , Na^+ , K^+ , Mg^{2+} , Ca^{2+}).
2. Dissolved gases (O_2 , N_2 , CO_2 , H_2S), pH.
3. Biogenic elements (compounds N, P, Si, Fe).
4. Organic substances.
5. Micronutrients.

Under water mineralization is understood the sum of all found in the analysis of mineral substances in mg/l or mg/dm^3 .

Σ - the amount of ions – actually there is the sum of all kinds of ions in mg/l or mg/dm^3 .

Primary sources of water composition include two factors:

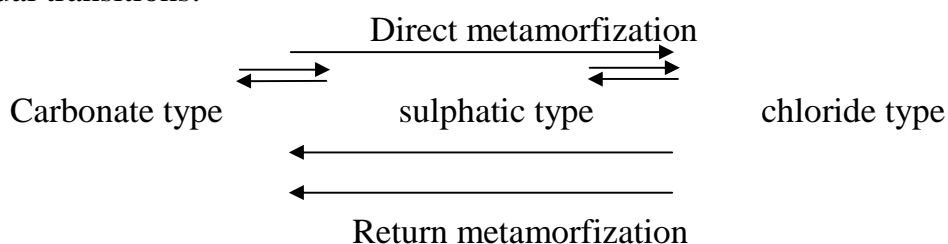
1. Gases emitted from the Earth's interior in the process of mantle degassing.
2. Products of chemical interaction of water with crystalline - volcanic rocks (granites, sionity, balzamity and others).

The founder of the natural waters theory Academician V.I. Vernadsky gave the first classification of natural waters. Depending on the salts concentration soluble therein, he subdivided them on: fresh waters with the salt content 0,1 %; saline waters with the salt content 0,1-5 %; brines with the salt content > 5 %.

On the basis of this law it is possible to make the selection, leaving only the components that are typical for all degrees of water mineralization: three cations Ca^{2+} , Mg^{2+} , Na^+ and three anion HCO_3^- , SO_4^{2-} , Cl^- .

Consideration of the properties of the system formed by these six components allows us to select a simple system where a portion of these ions plays a subordinate role, due to the formation of poorly soluble compounds. In accordance with this M.G. Valyashko allocates three types of water: *carbonate, sulfate, chloride*.

The main chemical types are connected among themselves by the following mutual transitions:



But characteristic property of the allocated types of waters is that transition of composition of water from one chemical type into another can't be carried out differently as by interaction with substance of environment. These processes are called as processes of a metamorfization of a chemical composition of natural waters.

Long-term systematic complex physical and chemical research of reservoirs and water currents of the Republic of Kazakhstan allows to reveal formation regularities of their hydrochemical mode and quality which are important in many areas of national economy and sciences.