The Bioscan AN INTERNATIONAL QUARTERLY JOURNAL OF LIFE SCIENCES 19(2): S2: 436-437, 2024 www.thebioscan.com

Hydrogeochemical factors of formation of siliceous waters of the Pritashkent artesian basin

Mavlyanov P.N., Mavlyanov G.N., Ibragimov A.S.

State Enterprise of Hydrogeology and Engineering Geology, Tashkent.

Author for correspondence:

E-mail: mavlyanov_g@mail.ru; pulat@yandex.ru

Mavlyanov Pulat Narimanovich ORSID: 0000-0001-9536-5480

Mavlyanov Gani Narimanovich ORSID: 0000-0001-8244-5975

DOI: https://doi.org/10.63001/tbs.2024.v19.i02.S2.pp436-437

KEYWORDS
siliceous waters, Tashminvody, Cenomanian deposits

Received on:

01-08-2024

Accepted on:

19-11-2024

ABSTRACT

The aim of our research was to assess the content of siliceous siliceous matter in the wells of the Tashkent mineral waters.
Research methods. The object of the study was well 1(5) of the Tashminvody site. The silicon content was assessed using a mass spectrometer.
Research results. The results of the study showed an increased silicon content and they can be classified as siliceous mineral waters, which already have their own specific features. In general, for the basin, hydrocarbonate-chloride-calcium-magnesium waters are replaced by hydrocarbonate-sodium waters through a transition zone of hydrocarbonate-chloride-sodium waters formed during the displacement of Cenomanian deposits with waters common in Paleogene, Senonian-Turonian and Lower Cretaceous deposits.
Conclusions: Over the period of operation (70 years), the quality of thermal mineral waters has not undergone significant changes. An exception is the zone of hydrocarbonate-sulphate-sodium waters, where the water quality has changed under the influence of operation. Mineral water from wells No. 1 (5) in terms of silicic acid content refers to siliceous mineral drinking medicinal table waters.

INTRODUCTION

According to research, during the long-term exploitation of the water of the Cenomanian complex for the provision of medical and sanatorium services to the population of the two republics, the statistical levels have naturally been and are being worked out, i.e. the initial pressures have been reduced. [2,3,6,8] The reduction in pressure has also led to a decrease in pressure on the aquifer itself, i.e. the rocks of the aquifer have been freed from the load of the overlying rocks and the water itself. This fact has created favorable conditions for the transition of silicon from rocks to water. [1,4,6.7] As is known, the aquifer of the Cenomanian deposits is composed of limestones and sandstones containing, among other elements, silicon compounds.

A.M. Ovchinnikov notes that with increasing temperature the solubility of silicates increases and this fact explains the presence of silicic acid in thermal waters. Consequently, given that the mineral waters of the Tashkent region are waters with elevated temperatures, it can be assumed that the process of silicon transition from rocks to an aqueous solution occurs according to the formula described above. [3]

The aim of our research was to assess the content of siliceous silica in the wells of Tashkent Mineral Waters.

Research methods. The object of the study was well 1 (5) of the Tashminvody site. The silicon content was assessed using a mass spectrometer.

Results of the study. The results of the study showed an increased silicon content and they can be classified as siliceous mineral waters, which already have their own specific features. (table 1)

Table 1. Indicators of chemical analysis and silicic acid content in well 1(5) of the Tashminvody site (2023)

Selection date	H_2SiO_3	Kurlov's formula
21.02.23	68,2 mg/l	$0,69\frac{HCO_3 65\, SO_4 20 Cl 14}{(N_a + K)93}$
15.04.23	52,3 mg/l	$0,58\frac{HCO_3 64 Cl\, 18 SO_4 15}{(N_a + K)96}$
23.06.23	73,2 mg/l	$0,65\frac{HCO_3 74 Cl\, 15\, SO_4 10}{(N_a + K)97}$

26.06.23	72,9 mg/l	$0,64\frac{HCO_3 73\ Cl\ 15 SO_4 11}{(N_a+K)95}$
02.07.23	62,2 mg/l	$0,69\frac{HCO_3 64 SO_4\ 20\ Cl\ 16}{(N_a+K)96}$
09.07.23	72,9 mg/l	$0,69\frac{HCO_3 65 SO_4\ 17\ Cl\ 16}{(N_a+K)92}$
17.07.23	59,9 mg/l	$0,69\frac{HCO_3 64 SO_4\ 19\ Cl\ 16}{(N_a+K)95}$
12.08.23	67,7 mg/l	$0,69\frac{HCO_3 62 SO_4\ 20\ Cl\ 15}{(N_a+K)94}$
19.08.23	72,9 mg/l	$0,69\frac{HCO_3 64 SO_4\ 19 Cl\ 16}{(N_a+K)95}$

*Note – metasilicic acid – $H_2Si\ O_3$

These features are expressed in the fact that if nitrogen-alkaline waters have a healing factor affecting the gastrointestinal tract, supporting organs, etc., then siliceous waters (except for those listed) have a certain positive effect on metabolism, bile ducts, supporting organs, the nervous system, etc.

Hydrogeochemical conditions of the aquifer complex of Cenomanian deposits of the Tashkent artesian basin are diverse and complicated by the imposition or influence of a small number of factors. The main ones that had a significant impact on the formation of the chemical composition of the thermomineral waters of the aquifer complex of Cenomanian deposits can be considered geotectonic, the intensity of which has repeatedly changed at various stages in the history of the geological development of the region in question, seismic and technogenic (reduction of pressure by 120-170 m).

For most artesian basins, the most common hydrochemical pattern is considered to be an increase in the mineralization of groundwater with depth, accompanied by a change in its composition.

We explain the increase in the concentration of metasilicic acid H2SiO3 by the intensity of groundwater extraction (starting in 1965 - 127 l/s, and in 1967 - 224.3 l/s), while the area of the depression funnel was 1255 km2 and the radius of influence was up to 40 km.

CONCLUSION

1. In general, for the basin, hydrocarbonate-chloride-calcium-magnesium waters are replaced by hydrocarbonate-sodium waters through a transition zone of hydrocarbonate-chloride-sodium waters formed during the displacement of Cenomanian deposits with waters common in Paleogene, Senonian-Turonian and Lower Cretaceous deposits.

2. Over the period of operation (70 years), the quality of thermomineral waters has not undergone significant changes. An exception is the zone of hydrocarbonate-sulphate-sodium waters, where the water quality has changed under the influence of operation.

3. Mineral water from wells No. 1 (5) in terms of silicic acid content refers to siliceous mineral drinking medicinal table waters.

REFERENCES

- Arsanova G.I. On the geochemistry of cesium: the source of cesium in thermal waters and acidic volcanics // Electronic scientific publication Almanac. Space and Time. - T. 4. - 2013. - Issue. 1.
- Badminov P.S. Estimation of deep temperatures of thermal springs of Khangai and Eastern Sayan using hydrochemical geothermometers / P.S. Badminov [and others] // Bulletin of BSU. Chemistry, physics. - 2011. - Issue. 3. - pp. 90-94.
- Bakiev S.A., Ibragimov A.S., Bimurzaev G.A., Ismailov B.Zh., Gafurov T.A. Khasanova G.I. Heavy metals in groundwater of oil and gas structures// Scientific and innovative aspects of modern hydrogeological, engineering-geological and geoecological research Proceedings of the Republican scientific and technical conference October 14, 2022 Vol. 2 p-40-42 47. http://www.tk- chel.ru/download/doc/BasicGPS.pdf. Satellite navigation updates. 2007 (updated 03/27/2019; 16:50).
- Geochemistry of groundwater. Theoretical, applied and ecological aspects / S.R. Kraynov, B.N. Ryzhenko, V.M. Shvets; Responsible editor: Academician N.P. Laverov. - M.: Nauka, 2004. - 677 p.
- Guseva N.V. Study of saturation of thermal waters with secondary minerals (on the example of the natural complex Tarys, Tuva) / N.V. Guseva, Yu.G. Kopylova, A.A. Khvaschevskaya // Tomsk Polytechnic University. Section of geochemistry of natural waters. - 2015. - P. 400-404.
- Zippa E.V. Geochemistry of thermal waters of Jiangxi province (China): Abstract of Cand. Geol.-Min. Sci. (2015). - Tomsk, 2020. - 22 p.
- M.Zh. Kholmirzaev, V.M. Zifarova, U.Kh. Karimov, B.D. Abdullaev Formation and protection of groundwater in the Chirchik and Akhangaran river valleys.\\ International scientific and educational electronic journal "EDUCATION AND SCIENCE IN THE 21ST CENTURY" Russia, Kemerovo, Kosmicheskaya st., house 7. 2021. 2
- Mavlyanov G.A., Mirzaev S.Sh., Islomov A.I. “Groundwater and physical and mechanical properties of rocks in the Tashkent region” Tashkent “Fan” 1975