DETERMINATION OF WATER HARDNESS BY TITROMETRY

Odilbekov B.O.
Student of Jizzakh Polytechnic Institute

Abdusalomov L.SH.
Student of Jizzakh Polytechnic Institute

Khurramov S.K.
Student of Jizzakh Polytechnic Institute
e-mail: geteroauksin@gmail.com

ABSTRACT

This article presents the determination of water hardness by water hardness and titrometry.

Keywords: equivalent, buffer, titration, complexon, indicator.

In natural water, various salts are always dissolved. Their quantity is low in snow, rainwater, and high in marine and oceanic waters. Natural waters contain magnesium, calcium, chlorides, sulfates, hydrocarbons and other additives. Depending on the amount of these substances in its composition, it decomposes water: water with a temporary hardness, water with a constant hardness, calcium hardness, magnesium hardness, water with a general hardness.

Calcium and magnesium ions in water are ions that cause water to harden. If these ions are removed from the water, the water will soften. Water softening devices, which are usually installed in homes, work according to the principle of removing calcium and magnesium ions in the water. These agents contain negatively charged ions, composed of molecules insoluble in large water and balanced with sodium. As the softening water passes through this device, negative ions instead of sodium trap calcium ions. Thus, sodium and calcium ions are exchanged. At the end of this process, the calcium content in the water decreases and the water softens.

The content of calcium and magnesium ions in natural waters is much higher than that of all other metal ions. Water hardness is a value that indicates the quality of water used in homes and industrial enterprises.

The hardness of the water is expressed by the milligrams-equivalent amount of calcium and magnesium in 1 liter of water. The overall hardness is determined in the presence of black eriochrome T by complexonometric titration with a complexone III

solution. When there is a need to determine the amount of calcium and magnesium individually, the total is initially determined, then precipitated in the form of calcium oxalate in a separate sample, and magnesium ions are titrated. With the addition of an ammonium buffer solution to the water being examined during analysis, its environment is brought to pH=10. As an indicator, black erichrome T is used, which forms dark-red water-soluble complexes with Ca^{2+} and Mg^{2+} ions, and the solution turns dark-red. The unstable complex decays when titrated with trilon B to form an unstable complex of Ca^{2+} and Mg^{2+} ions with trilon B.

The carbonate hardness of the water is determined by the calcium and magnesium bicarbonates in it $Ca(HCO_3)_2$ and $Mg(HCO_3)_2$. If the water with the salts mentioned in the composition is boiled, they decompose with the formation of Medium Salt sediments, and the hardness of the water disappears, for example:

$Ca(HCO_3)_2 = CaCO_3 + H_2O + CO_2$

For this reason, the carbonate hardness of water is also referred to as the vanishing or transient hardness. In steam boilers, samovars and other containers, it is in the formation of such sinks that water accumulates in the bottom when boiling.

The constant hardness of the water is determined by the other soluble salts (usually sulfates, chlorides) of calcium and magnesium in the water.

Water of a certain volume is titrated with hydrochloric acid in the presence of a methylorange indicator, the following reactions are formed when titration.

$Ca(HCO_3)_2 + 2HCl = CaCl_2 + 2H_2O + 2CO_2$

$Mg(HCO_3)_2 + 2HCl = MgCl_2 + 2H_2O + 2CO_2$

To determine the hardness of water in the method of titrometry, 50 or 100 ml of water is taken from the water examined with the help of a pipette with a capacity of 50 or 100 ml into a conical flask and titrated with a solution of hydrogen chloride, adding 2 — 3 drops of methylorange. In order for the results to be accurate, the titration is reversed 2 — 3 times, taking the corresponding arithmetic value.

When calculating the results of the analysis, for example, 2.77 ml of a 0.1 n li solution of hydrogen chloride is used to titrate 200 ml of the water being examined, 10.13.5 i.e. 50.65 ml of hydrochloric acid solution is used to titrate 1 liter of water.

0.1023 g in 1 l solution of hydrochloric acid.ekv. hydrochloric acid is present, while 1 ml contains 0.1023 ml/eqv of hydrogen chloride. Consequently, such amounts of hydrochloric acid are needed to titrate $Ca(HCO_3)_2$ and $Mg(HCO_3)_2$ in 1 l of water.

REFERENCES:

1. M.T.Gulomova, SH.Q.Norov, N.T.Turobov. “Analitik kimyo”.
2. Sobirovna K. D. et al. GRAVIMETRIK ANALIZ VA UNING TAHLILI //BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI. – 2023. – Т. 3. – №. 1. – С. 159-163.
3. қизи Муллажонова, З. С., Хамидов, С. Ҳ., & Хакбердиев, Ш. М. (2021). Турли усулларлар ёрдамида госсиполли комплекс таркибидан кумуш ионини аниқлаш. Science and Education, 2(3), 64-70.
4. Ҳамидов, С. Х., Муллажонова, З. С. Қ., & Хакбердиев, Ш. М. (2021). Кумушнинг госсиполли комплекси ва спектрал таҳлили. Science and Education, 2(2).
5. Хамидов, С. Ҳ., & Хакбердиев, Ш. М. (2021). Бирламчи алифатик аминларнинг госсиполли ҳосилалари синтези. Science and Education, 2(3), 113-118.
6. Xamidov, S. X. (2022). Gossipolning biologiok faol modda sifatida qo‘llanilishi. Science and Education, 3(1), 61-65.
7. Hamidov, S. X., Mullajonova, Z. S. Q., & Xakberdiev Sh, M. (2021). Gossypol complex and spectral analysis of silver. Science and Education, 2(2).
8. Abulkasimovich A. A., Khodyevich K. S. Recycling of molybdenum waste by hydrometallurgical method //Eurasian Research Bulletin. – 2022. – Т. 11. – С. 1-4.
9. Абдуллаев А., Хамидов С. ОЛТИН АЖРАТУВЧИ ФАБРИКАНИНГ АТРОФ МУҲИТГА ТАЪСИРИ //Журнал естественных наук. – 2022. – Т. 1. – №. 2 (7). – С. 325-329.
10. Хамидов С. Х., Абдуллаев А. А. КУМУШИОНИНИНГ ГОССИПОЛ РЕАГЕНТИ БИЛАН РАНГЛИ КОМПЛЕКСИ ҲОСИЛ БЎЛИШИ //Central Asian Research Journal for Interdisciplinary Studies (CARJIS). – 2022. – Т. 2. – №. 3. – С. 364-375.
11. Abdurasulov, S., & Kurbanova, D. (2023). TITRIMETRIK ANALIZ ASOSLARI VA USULLARI. TITRIMETRIK ANALIZDA HISOBLASHLAR. Current approaches and new research in modern sciences, 2(1), 57-62.
12. Mahramovich K. S. et al. STUDY OF THE PRACTICAL SIGNIFICANCE OF BENZIMIDAZOLE AND SOME OF ITS DERIVATIVES //Open Access Repository. – 2023. – Т. 4. – №. 02. – С. 80-85.
13. Mahramovich K. S., Khodiyevich K. S. CHEMICAL STRUCTURE AND PRACTICAL SIGNIFICANCE OF RESVERATROL. – 2022.
14. Khakberdiev Shukhrat Mahramovich, Khamidov Sobir Khodiyevich. (2023). CHEMICAL STRUCTURE AND PRACTICAL SIGNIFICANCE OF BENZOXAZOLE . Ethiopian International Journal of Multidisciplinary Research, 10(09), 75–77.
15. FN ugli Norkoziyev, RT ugli Maksudov, SK Khamidov - SCHOLAR, 2023 TYPES AND ANALYSIS OF GRAVIMETRIC ANALYSIS
16. GRAVIMETRIK ANALIZ USULI BILAN KALSIY MIQDORINI ANIQLASH SX Xamidov - SCHOLAR, 2023 2023/11/20
17. Kurbanova D. S. et al. Titration of Cu (II) IONS WITH SOLUTIONS of ORGANIC REAGENTS //Eurasian Journal of Engineering and Technology. – 2022. – Т. 7. – С. 47-50.