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CORROSION AND SCALE FORMATION ARE ASSOCIATED WITH THE CHARACTERISTIC FEATURES OF WATER AND METALS

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Annotation

The urgency of the problem is due to the fact that the use of water as a cooling agent leads to corrosion and scale formation, pollution, development and growth of microorganisms in catchment cycles. As a result, the efficiency of heat transfer decreases, energy consumption increases and operating costs increase.

Keywords: water supply, corrosion, environment, water, equipment.

Introduction

In circulating water supply systems, intense corrosion and scale formation of the surface of heat exchange equipment is observed, which are destroyed due to physical and chemical effects with the environment. The processes of corrosion and scale formation are associated with the characteristic features of water and metals. The damage associated with the corrosion of the circulating water supply in world practice amounts to millions of dollars a year. In addition, due to the through corrosion of heat exchangers, there is a significant pollution of water with heat engineering products.

At present, the rational use of water resources, including in the oil refining industry, as cooling water for heat exchange equipment, is of particular importance for the Republic of Uzbekistan. At the same time, there are problems of using better quality water in terms of hardness, salt content, pH of the medium, etc. The main influence is given to the influence of water quality on the wear of heat exchange equipment and the efficiency of their use in various technological processes.

The urgency of the problem is due to the fact that the use of water as a cooling agent leads to corrosion and scale formation, pollution, the development and growth of microorganisms in the catchment cycles. The result is reduced heat transfer efficiency, increased energy consumption and increased operating costs.

Among the known methods of combating corrosion, inhibition is the most widely used, as one of the simplest and most cost-effective methods.

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The advantage of this method is the possibility of using without changing the existing technological processes of production and processing, transportation of oil and gas semi-products. Currently, all gas condensate wells, which contain corrosive components - carbon dioxide and hydrogen sulfide, highly mineralized formation waters are subject to inhibition in order to prevent corrosion damage to tubing, as well as gas treatment units and heat exchange equipment at oil refineries.

The surface of heat exchange equipment in oil refineries, upon contact with water heated to a high temperature, after some time becomes covered with scale. This process is caused by the fact that further fresh water initially contains a large amount of solutions of calcium and magnesium salts. Scale is one of the main factors in reducing the energy efficiency of heat exchange equipment, in addition, scale reduces the useful cross-section of the pipes, thereby increasing the hydraulic resistance of the heat exchanger pipes. All this together entails excessive fuel consumption, and according to scientific and technical literature, a layer of scale up to 0.2 mm thick increases fuel consumption by 3%, and a layer of 1 mm by 7%, which is why heat exchangers are a very important event. It allows you to protect the heat exchangers from damage and maintain the operational parameters of the heat exchanger, at the level of the passport characteristics, while maintaining the manufacturer's guaranteed service life. In this regard, the protection against scale is more advantageous than the subsequent elimination of scale on the walls of heat exchangers operating on different waters.

Due to the lack of production of corrosion and scale inhibitors in Uzbekistan, these products are import-substituting and are of significant scientific and practical interest.

The results of the monitoring of the waters used in the internal water supply of the Fergana refinery showed the presence of corrosion and scale processes, which negatively affect the efficiency of the heat exchange equipment, and in order to increase efficiency, corrosion and scale inhibitors of the GPMSh type have been developed. Technological regulations were developed for the production of new compositions of corrosion and scale inhibitors of the GPMSh type and methods of their production testing and control.

Based on the comparative industrial tests of the developed corrosion and scale inhibitor GPMSh with imported OEDPA (hydroxyethylidene diphosphonic acid), GPMSh was recognized as the most effective import-substituting corrosion and scale inhibitor and recommended for implementation.

Most often, nonionic polyphosphates, sulfonic acid derivatives, organic derivatives of phosphonic and phosphoric acids, low molecular weight polycarboxylic acids, polymers and copolymers of acrylic and maleic acids, as well as various compositions of the listed compounds act as an active substance in scale inhibitors. Inhibitors based on phosphonic acids and polymers are widely used.

The advantage of organophosphate inhibitors is their high efficiency at relatively low costs. Scale inhibitors are widespread, in which oxyethylidene diphosphonic acid (HEDPA) is used as the basis of the composition. It should be noted that acid-based inhibitors often contribute to corrosive processes in oilfield equipment.

The technical result of the development of the GPMShch is the achievement of the claimed composition at the same time a double effect of increasing the efficiency of preventing the formation of calcium carbonate during a long time of operation of heat exchange equipment, as well as increasing the efficiency of protecting heat exchange equipment from corrosion - that is, obtaining a salt deposition and corrosion inhibitor GPMSch.

Our tests of new compositions of corrosion inhibitors and salt deposition in the conditions of the Fergana refinery on the water of internal water supply. The corrosion and scale inhibitor GPMSh was tested in comparison with the imported scale inhibitor OEDPK. Using the method on the device ISO-1 for scale deposition, and to determine the degree of corrosion inhibition used the gravimetric method. The results are shown in Table 1.

Table 1. Comparative efficiency of scaling inhibition by reagents "GPMSh" and "OEDFK" on the ISO-1 device and the effectiveness of corrosion inhibition

Inhibitor	Inhibitor concentration, mg/L	Volume of Trilon-B titer solution (0.025 n), ml	The amount of deposits on the electrode, (PCaCO3), mg	Effective inhibition scaling, (E_{iso}),%	Corrosion rate *Vk*, g/m² hour	Protection degree, (Z) against corrosion, %
No inhibitor	–	8,5	10,625	0	0,0000205475	0
GPMC	20	0,8	1	90	–	–
	40	0,75	0,9375	91,17	–	–
	50	0,7	0,875	91,76	0,0000064287	68,71
OEDFC	20	0,6	0,75	92,94	–	–
	40	0,6	0,75	92,94	–	–
	50	0,5	0,625	94,11	0,0000245186	0

As evidenced, the efficiency of the use of the corrosion and scale inhibitor GPMSh has been determined relative to the imported HEDPK. With the value of the corrosion rate for GPMSh - 0.0000064287 and OEDFK - 0.0000245186. The efficiency of inhibition of scale deposits for GPMS is 91.76%, and for the imported scale inhibitor OEDPK - 94.11%. As well as the corrosion and scale inhibitor GPMShch in terms of corrosion protection efficiency is 68.71% and which can be recommended for implementation .

According to the results obtained, it was found that with an increase in concentration from 15 to 80 mg / dm3, a gradual increase in the efficiency of the reagent is observed. At a concentration above 45 mg / dm3, inclusive, the protective effect of the developed inhibitor of complex action exceeds 90%.

The next step was to assess the effectiveness of preventing accelerated carbon dioxide corrosion when using the GPMC. In the framework of the tests carried out, the effectiveness of inhibition of both general and local corrosion was evaluated.

Figure 1 shows the dynamics of the decrease in the corrosion rate of steel, after the dosage of GPMC at various concentrations.

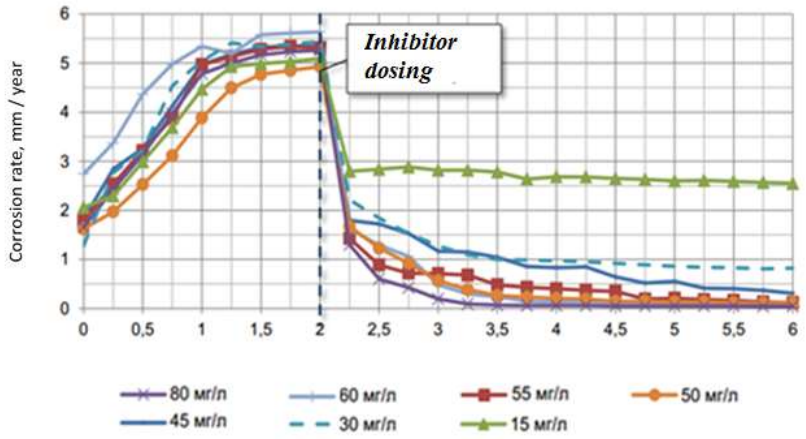

Figure 1. Dynamics of a decrease in the corrosion rate after dosing with GPMC

Thus, according to the results of all the studies carried out, it was found that the dosage of GPMC equal to 45 mg / dm3 is the most optimal from the point of view of preventing the formation of scale deposits and corrosion. When carrying out a further set of tests, the concentration of HPMC was taken 45 mg / dm3, as the base dosage, providing a protective effect of more than 90%.

According to the results of the study, it can be concluded that the imported HEDPhK inhibitor is only a scale inhibitor, and does not show any reaction to

corrosion protection. Another inhibitor developed from the local resource GPMC is not only a scale inhibitor, but also a corrosion inhibitor.

REFERENCES

1. Khodjayeva N. S., Mamurova D. I., Nafisa A. IMPORTANCE IN PEDAGOGICAL TECHNIQUES AND EDUCATIONAL ACTIVITY //International Engineering Journal For Research & Development. – 2020. – Т. 5. – №. CONGRESS. – С. 5-5.
2. Olimov, Shirinboy Sharofovich. "THE INNOVATION PROCESS IS A PRIORITY IN THE DEVELOPMENT OF PEDAGOGICAL SCIENCES." (2021).
3. Islamovna M. D. The value of using the autocad program in the works of machine-building drawings for building fastening parts //Proceeding of The ICECRS. – 2019. – Т. 3.
4. Aminov, A. S., Shukurov, A. R., & Mamurova, D. I. (2021). Problems Of Developing The Most Important Didactic Tool For Activating The Learning Process Of Students In The Educational Process. *International Journal of Progressive Sciences and Technologies*, *25*(1), 156-159.
5. Aminov, A. S., Mamurova, D. I., & Shukurov, A. R. (2021, February). ADDITIONAL AND DIDACTIC GAME TECHNOLOGIES ON THE TOPIC OF LOCAL APPEARANCE. In *E-Conference Globe* (pp. 34-37).
6. Mamurova D. I., Ibatova N. I., Badieva D. M. THE IMPORTANCE OF USING THE KEYS-STADI INNOVATIVE EDUCATIONAL TECHNOLOGY METHOD IN TRAINING THE IMAGE MODULE OF GEOMETRIC SHAPES //Scientific reports of Bukhara State University. – 2020. – Т. 4. – №. 1. – С. 335-338.
7. Nazarova S. M., Zaripov G. T. GENERAL PHYSICAL PROPERTIES OF IRRIGATED GRASS SOILS OF BUKHARA OAZIS AND WAYS TO IMPROVE THEM //Scientific reports of Bukhara State University. – 2020. – Т. 4. – №. 3. – С. 66-69.
8. Samadvich, A. S., Nayimovich, A. S., & Nosirovna, S. M. (2021). Technology Of Teaching Fine Arts And Science Classroom. *International Journal of Progressive Sciences and Technologies*, *25*(2), 109-111.
9. Muzafarovaa A. N. FORMS OF PREPARATION OF FUTURE TEACHERS FOR VISUAL AND CREATIVE ACTIVITIES //Euro-Asia Conferences. – 2021. – С. 119-123.
10. Мамурова Ф. И., Мамурова Д. И. КОМПЬЮТЕР ГРАФИКАСИ ФАНИНИ ЎҚИТИШ ҲОЛАТИ //TULAGANOV AA. – С. 145.
11. Mamurova, F. I., & oglu Akmalov, J. O. (2021). ORGANIZATION OF GEODESIC WORK. STATE GEODESIC NETWORKS. *Conferencious Online*, 21-23.

12. Mamurova, F. I. (2021, May). ARTIST OF UZBEKISTAN MAKSUD SHEIKHZADE. In *E-Conference Globe* (pp. 176-178).
13. Olimov, S. S., & Mamurova, D. I. (2021). Graphic Information Processing Technology and its Importance. *European Journal of Life Safety and Stability (2660-9630)*, *10*, 1-4.

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