CORROSION RESISTANCE OF ALITIATED COATINGS IN ARSENIC-SODA ENVIRONMENT

B. Sereda, Doctor of Technical Sciences, professor, Head of the Department,
A. Prolomov, graduate student, A. Kyslyy, student

Dniprovsky State Technical University,
59002, Kamianske., Str. Dniprobudivska, 2
e-mail: seredabp@ukr.net

Traditional technologies of chemical-heat treatment are characterized by high energy consumption and duration of processes. One of the most effective methods of creating coatings with high mechanical and physicochemical properties are diffusion surface alloying of metal under conditions of self-propagating high-temperature synthesis The technology of obtaining coatings in the conditions of self-propagating high-temperature synthesis (SHS), combined with chemical transport reactions, is devoid of these shortcomings and provides high (up to 95 %) stability of processing results. Among the technological processes an important place is occupied by technologies of saturation of the surface layer of steels with aluminum, chromium and silicon. However, it should be noted that this technology has a number of significant disadvantages, which include energy consumption, high duration of processing and in some cases the inability to obtain coatings with a high content of several saturating elements in the surface layer. SHS – high-intensity exothermic interaction of chemical elements in the condensed phase, capable of involuntary propagation in the form of a combustion wave. Solutions of arsenic-soda sulfur contain corrosion activators: chloride, rhodanides, sulfates, but in addition to these solutions contain arsenic compounds that are corrosion inhibitors. This circumstance provokes ulcerative corrosion in places with low content of adsorbed inhibitor.

Studies have shown that in the upper part of the arsenic-soda solution, which contains (g/l): arsenic oxide – up to 17, sodium thiosulfate – 280, sodium rhodanide – 120, sodium chloride – up to 2, sodium carbonate – up to 18. Vertical apparatus with stirring device Arsenic-soda solution containing 270 g/l: arsenic sulfate and free sulfuric acid up to 0.7÷1.3 g/l, pH – from 3 to 7.

The results of corrosion gravimetric tests of samples of various structural materials in aggressive environments of arsenic-soda desulfurization PJSC «Zaporozhkoks» (mixer neutralizer arsenic-soda desulfurization, test time – 700 hours, (g/m^2)) Vst 3 – 2.4, 0.8X13 – 2.3, Al – Cr (steel 20) – 0.26, Al – Ti (steel 20) – 0.27, Al – Si (steel 20) – 0.28, 12X18H10T – 0.15. Based on the above data, steady are steels 10X17H13M2T, 10X17H13M3T. Austenitic steel 12X18H10T are subject to point and ulcerative corrosion. Alloy materials also show high corrosion resistance under these conditions and can be used to protect carbon steel.

References

1. Surface strengthening of working materials in the conditions of complex influence of aggressive substances: monograph / B.P. Sereda, L.P. Bannikov, S.V. Nesterenko, O.S. Gaidaenko and others. DDTU, 2019. – 173 p.