

STUDY OF CORROSION FORMS ON METAL SURFACES AT COMBUSTION OF COAL WITH HIGH SALT CONTENT

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The main source of the formation of deposits (slagging) on the heating surfaces is sulfates of alkaline, alkali-earth metals and iron, and the main cause of under-deposit corrosion of metal surfaces is chlorine compounds, primarily hydrogen chloride. The complexity of the processes of slagging and corrosion, which occur when using various fuel raw materials, determine the need for detailed study of each type of fuel, especially one with an increased content of salts (Na_2O in ash $\geq 2\%$). Experimental studies were carried out on samples of salty coal (SC) from Northern Donbass (Table 1).

Table 1. Characteristics of salty coal samples

Coal deposit	A ^d , %	V ^{daf} , %	W ^a , %	Na ₂ O in ash, %	S ^d , %	Cl ^d , %
Bohdanivsk №4	5.0-5.7	42.8	12.7	6.62-7.22	1.2	0.8
Starobilsk №12	7.0-7.7	43.7	20.3	6.43-6.71	2.8	0.7

The study of the intensity of slagging (formation of deposits) at coal combustion on metal surfaces was carried out by the gravimetric method. The development of corrosion processes was assessed by visually determining the morphological features of metal surfaces and the mineral composition of exfoliated layers (scale) using X-ray diffraction analysis. It was established the formation of deposits on the metal surface occurs when using different types of fuel (biomass waste, wood biomass, different types of coal), but the most significant effect occurs in the case of salty coal [1]. At the same time the removal of salts from coal by water washing leads to a noticeable decrease in the mass of deposits. Fig. 1 shows the metal surfaces that were exposed to the combustion products of salty and desalted coal of the Bohdanivsk deposit. The surface of the metal under the influence of the combustion products of the SC is covered (up to 63 %) with scaly formations. At the same time, similar formations on the surface exposed to desalted coal gases cover only 19 % of the surface. The same picture was observed for Starobilsk deposit, where the surface after exposure to initial SC is covered with scaly formations by 70 %, and after desalting by less than 20 %. Mass of these layers was close to 0. And composition of exfoliated layers of initial samples is presented in Table 2.



Fig. 1. The influence of salty (a, b) and desalted (c, d) coal on morphology of metal surfaces

Table 2. The composition of scale from metal surfaces

Coal deposit	Fe ₂ O ₃ , %	Fe ₃ O ₄ , %	FeO, %	FeS, %	NaCl, %
Bohdanivsk №4	35	17	30	16	2
Starobilsk №12	44	25	15	13	3

I. T. Shendrik, N. Dunayevska, A. Tsaryuk, V. Yelahn, A. Fateyev. Experimental development of approaches to reduce the slagging and corrosive activity of salty coal // Eastern European Journal of Enterprise Technologies. 2020. No 6. P. 124–133.