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Properties of anti-corrosive ferrite pigment synthesized with the use of production waste

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Abstract

© 2018, International Multidisciplinary Scientific Geoconference. All rights reserved. Pigments of the inhibitory type are the active principle of most primers used to protect metals from corrosion. Developers of anticorrosive paint and varnish materials seek to replace chromium-containing pigments, which widely used until recently due to their toxicity, with more environmentally appropriate choices. These include ferrite pigments. It is known, that the most spread method for the synthesis of ferrites, which are complex oxides or salts of ferrous acid, is the joint calcination of iron oxides with oxides having basic properties. The aim of this work is an expansion of the raw material base to produce ferritic pigments by using as one of the initial components an aspiration dust (content of iron oxide exceeds 70 %) formed as a waste in steel-casting plants. Crushed brucite (natural magnesium oxide) was used as the second component. After their thorough mixing, the resulting mixture was calcined at the reaction temperature: $MgO + Fe_2O_3 \rightarrow MgFe_2O_4$ (1) $6MgO + 4Fe_3O_4 + O_2 \rightarrow 6MgFe_2O_4$ (2) with obtaining of magnesium ferrite. The course of the reaction was controlled by thermogravimetry and differential thermal analysis. Ferritic-magnetite structure formation was recorded by X-ray diffraction analysis. The variation of the synthesis's temperature-time conditions made it possible to find the optimal parameters for obtaining ferrite. The synthesized ferrite was ground on a planetary mill. The studying of the painting and technical properties of the grinding product showed that it can be used as a pigment in the production of paints and varnishes. The results of electrochemical studies of steel in contact with the aqueous extract of ferritic pigment containing 3% of sodium chloride led to the conclusion of the high ability of the resulting product to inhibit the corrosion processes.

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Keywords

Coatings, Corrosion, Corrosion prevention, Ferrite, Paint, Pigments, Waste treatment

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