

The study found that the amount of garbage classification papers showed an increasing trend in time series. China, the United States and the United Kingdom are more prominent in the global garbage classification research. The research hotspots are mainly concentrated in four major areas, №1 and №2 demolition waste, №4 municipal solid waste worker, №5 exploring critical success factor, №6 health risk assessment.

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APPLICATION OF ACID TAR WASTE AS FILLERS IN BITUMINOUS MATERIALS

Acid tar waste is formed by sulfuric acid purification of mineral oils, by the production of sulfonate additives, in alkylation processes where sulfuric acid as a catalyst is used. This type of waste causes a serious environmental problem [1]. Acid tar waste accumulates in dumps and open storage ponds where the acid is washed out by atmospheric precipitation and as a result SO₂ and SO₃ is released, that results in contamination of the water and air pools [2, 3]. Acid tar is one of the most difficult products to waste dispose [4]. At the same time the acid sludge is a valuable secondary material resource for the production of certain products including commercial petroleum products [5]. Acid tars are highly viscous liquid petroleum products consisting of a mixture of heavy hydrocarbons and sulfuric acid.

The aim of this research is to observe the process of the neutralization of the acid tar waste during the production of the sulfonate additives with dolomite flour and chemical water treatment sludge at the CHP plant, produced on the basis of the neutralization products of bituminous materials.

As a neutralizing agent a natural mineral – dolomite powder was used. The sludge of chemical water treatment from a combined heat and power plant was used as a second neutralizing agent, which has not found qualified use and accumulates in dumps. The content of calcium carbonate and pH value in the sludge are significantly higher than in dolomite powder. The treatment of acidic tar waste of the production of sulfonate additives of JVLL"LLK-NAFTAN" is carried out in two stages. The acidic tar waste was heated to a temperature of 80-110°C and mixed with neutralizing agents (dolomite flour and chemical water treatment sludge at the CHP plant (CWTS)) are added at 5...20 wt. on acidic tar waste.

It is established that the degree of change in the acid number is approximately the same at 80, 90 and 100°C and a significant decrease in the acid number by more than in 2 times is relative to the initial value which is found upon neutralization at 110°C. This is probably due to the fact that during heat treatment of acid tar waste at 110°C there is a low-temperature decomposition. The neutralization process is more effective when one uses CWTS which correlates with the pH of the neutralizing agents. Almost neutral product can be obtained with

the addition of CWTS of about 10% by weight as well as the same acidity value only with a 20% additive of dolomite flour. Based on the products of neutralization of acid tar waste it is proposed to obtain bituminous roofing bitumen according to GOST 2889 since various dust-like fillers and, in particular, fine-grained dolomites are used to produce this mastic. As a bituminous binder for the preparation of mastic, oil road bitumen BND 60/90 is used. The addition of the acid tar neutralization product leads to a significant increase in its hardness. The needle penetration depth decreases by more than 2 times with the involvement of twenty percent by weight of the neutral product. Also heat resistance increases, which might be the result of possible additional structuring processes. The main characteristics are determined (the brittleness temperature in the freezer, the flexibility and heat resistance), it is established that the obtained values do not exceed the normative values for bituminous mastic for roofs. The comparison of the obtained mastic based on neutralized acid tar with an industrial analogue showed that the obtained product satisfies the requirements of GOST 2889 and is suitable for further use.

Thus, the product of neutralization of acid tar waste from the production of sulfonate additives by chemical water treatment sludge at the CHP plant can be disposed of by mixing with bituminous binders and obtaining bituminous mastic for roofs. For neutralization dolomite flour is used but with double volume for neutralization.

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DEVELOPMENT OF THE UNIVERSAL BIODEGRADABLE DETERGENT'S PRODUCTION AND APPLICATION TECHNOLOGY

As a result of patent investigations the most relevant patented solutions to the present research were analyzed in the following areas: liquidation of emergency oil and oil product spills on the soil surface; washing of oil-contaminated surfaces, including oil sludge storage tanks; oil-sludge neutralization. The analysis showed that there is no detergent on the Russian market that is universal for use in all relevant areas and has biodegradability. [1]

In accordance with the principles of resource saving and energy efficiency [2], a technology for the production and use of three brands of universal biodegradable detergent from surface-active substances (surfactants) with demulsifying properties to intensify the processes of phase separation of hydrocarbon-containing media (further - Detergent) was created.