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STUDY OF THE EFFECT OF AGGRESSIVE ENVIRONMENTS AND CHEMICAL REAGENTS ON CHEMICAL-RESISTANT COMPOSITE MATERIALS

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The article presents the results of a study of the negative impact of various aggressive environments (waste oil, oil sludge, acid tar and phenolic wastewater) and chemical reagents (50 % aqueous solution of H_2SO_4 and 30 % aqueous solution of KOH) on a polymer-containing chemically resistant composite material (CRCM) obtained from waste and secondary products of the oil refining and coke chemical industries of Ukraine. The destructive effect on structural materials of additives, resinous-asphalt substances, alkalis, organic and mineral acids, phenols contained in the production and purification waste of commodity and waste oil products, industrial wastewater is analyzed. A structural scheme for obtaining CRCM for further laboratory research is proposed. Implementing this scheme, two compositions were obtained: A (50 % (PET, HDPE) + 30 % (sand) + 10 % (coke dust) + 5 % (used SAE 15W-40 oil) + 5 % (kaolin)) and B (50 % (PET, HDPE) + 25 % (sand) + 15 % (ash) + 5 % (used SAE 15W-40 oil) + 5% (kaolin)). It was on these compositions, under static research conditions (duration 12 months, ambient temperature 25 °C), that the negative impact of aggressive environments on CRCM was determined.

It has been established that this effect manifests itself in a decrease in compressive strength (depending on the composition and aggressive environment from 36(28) MPa to 28-35 (18-27) MPa) and an increase in the mass of the sample Δm (depending on the composition and aggressive environment by 0.01-0.14 or by 0.03-0.21). It has been determined that the proposed CRCM samples exhibit high resistance to aggressive chemical reagents such as a 50 % aqueous solution of H_2SO_4 (the change in the ratio of the sample height to diameter (H/D) was 7.6 % for composition A) and 10.0 % for composition B) and 30 % aqueous solution of KOH (the change in H/D was 12.8 % for composition A and 15.6 % for composition B). Such high resistance of CRCM to aggressive environments and chemical reagents makes them a very promising material for use in oil refineries and coke chemical plants instead of reinforced concrete structures in biological wastewater treatment and drainage systems, at production sites, and in production waste storage areas.

Keywords: oil refining and coking industry, composite material, chemical resistance, processing, polymers, oil sludge, acid tar, coke dust, ash, phenolic wastewater.

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