INVESTIGATION OF POLYMER COATINGS WHILE DECORATING THE SURFACE OF POLYETHYLENE TUBA CASES

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The objects of the study were linear high-pressure polyethylene (LLDPE), obtained by Borstar technology and modified epoxy materials used for decorating the surface of polyethylene tuba cases. The coating (decoration) was carried out by the method of flexography, the structuring of the reactive oligomer was performed using ultraviolet radiation.

In order to increase the surface energy of LLDPE, the surface of the shells of polyethylene tubes was corona-treated. At the same time, the integrated surface energy of LLDPE increased from 29–30 mN / m to 38–43 mN / m.

The surface tension (energy) of the studied polymers (integral value, dispersion and polar components) was evaluated when determining the wetting angle with the test low molecular weight liquids with different surface tensions.

Determination of the wetting angle was carried out on a special laboratory setup, taking into account (leveling) the effect of temperature and gravitational factors on the value of the analyzed parameter. The number of parallel experiments per an experimental point (wetting angle) is 15–17.

The coefficient of the analyzed parameter did not exceed 3–5% in these studies. The surface energy of the epoxy materials of the compositions investigated in this work was 43–45 mN / m.

The thermodynamic work of adhesion, wetting energy, spreading coefficient according to Garkins of low-molecular-weight test fluids and oligomeric epoxy materials on the surface of the original and corona-treated linear high-density polyethylene were determined.

The work of adhesion and other thermodynamic wetting parameters for epoxy materials at the stage of structuring a reactive oligomer in an equilibrium state with different surface energy of the substrate (initial and corona-treated at different modes of high-pressure polyethylene) were also analyzed.

Within the framework of the thermodynamic approach, the probability of delamination in the composite system "LLDPE - epoxy polymer coating" was evaluated during the operation in various physically and chemically aggressive environments for the studied composites "polymer substrate - decorative polymer coating".

A thorough analysis of the experimental and theoretical calculations of the adhesive and performance properties of the decorated cases of polyethylene tubes was carried out. LLDPE surface decoration was carried out by the method of flexography. A correlation relationship was found out between the value of the surface energy of LLDPE, the strength of the adhesive contact of the material to be decorated (based on epoxy polymer) and the operational durability (operability) of polyethylene tuba with a polymer coating.

The influence of the polar component of the surface energy of LLDPE on the strength of the adhesive contact in the system "LLDPE - decorative polymer coating" is shown.