

Distillation of petroleum products from water by hydrophobic membranes

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Abstract

Distillation of petroleum products by means of microfiltration hydrophobic membranes with a pore of 0.47 microns size on running installation with selection of a filtrate for the quantitative chemical analysis was studied. Hydrophobic membrane made of polytetrafluoroethylene (PTFE) and hydrophilic nylon membrane was used to separate of petroleum products. Nylon membrane was kept in toluene to give hydrophobic properties before distillation. 1:1 mixture of tetrachloromethane and water and 1:1 mixture of hexane and water have been separated. Membrane distillation experiments were conducted at working pressure 0.1 MPa and temperature was 25° C. Tetrachloromethane flow speed through the PTFE membrane was 14.4 cm³/cm²min, through the nylon membrane was 13.8 cm³/cm²min. Hexane is lighter than water, as is known, and between membranes and hexane is layer of water. To bring the hexane to the membrane surface through the layer of water, mixture mixed at a speed of 1000 rpm during the filtration. Filtration speed during passing hexane through PTFE membrane was 9.6cm³/cm²min, for nylon membrane filtration speed was 3.1 cm³/cm²min. Optimal parameters of membrane separation processes were chosen. Oil products content in water after filtration were was studied. The initial concentration of oil products was 500 g/dm³. Residual content of oil products during filtration of hexane-water mix through PTFE membrane is 1140 mg/dm³, and for nylon membrane is 1230 mg/dm³. Residual content of hydrocarbons in water is associated with dissolution of hexane and formation of an emulsion hexane in water as a result of mixing during filtration.

Keywords

Emulsions, Membranes, Nylon membrane, Polytetrafluoroethylene