PERVAPORATION DEHYDRATION BY PVA - FULLERENOL - CHITOSAN MIXED MATRIX MEMBRANES

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ABSTRACT
The aim of this work is to investigate the impact of blending of PVA with chitosan and low-
hydroxylated fullerene C_{60}(OH)_{12} (fullerenol) on the physical, chemical and transport
properties of polyvinyl alcohol (PVA). The conditions of preparation and cross-linking of
membranes based on nanocomposite PVA - fullerenol - chitosan were developed. Structural
and physico-chemical characteristics of composite membranes were studied by IR
spectroscopy, scanning electron microscopy and sorption experiments. The transport
properties of membranes were investigated for separation of water containing mixtures by
pervaporation.

Keywords: pervaporation, mix matrix membrane, composite, fullerenol.

INTRODUCTION
Membrane methods are highly demanded in various industries for the purification,
concentration and separation of liquid and gaseous mixtures due to its unique properties. One
of the most promising membrane technologies for separation of low-molecular liquid
mixtures is pervaporation which can be used for various industrial scales. Pervaporation can
be easily used for separation of azeotropic mixtures, mixtures of isomers, close-boiling and
thermally unstable substances. The performance characteristics of this method make it
attractive for the chemical, petrochemical, biochemical, pharmaceutical industry as an
alternative process of modern methods.

The rapid development of membrane technology, in particular pervaporation, requires the
creation of new materials with improved characteristics. Among the variety of membrane
materials, the polymers take an important place as they have good mechanical characteristics,
film forming properties and selectivity. However, the disadvantage of the majority of known
and commonly used polymers, including well-known polyvinyl alcohol (PVA), is low
permeability.

RESULTS AND CONCLUSIONS
One of the most promising ways of changes in physico-chemical (structural, mechanical) and
transport characteristics of the membrane material is a modification of polymers by known
carbon nanoparticles, and blending by another polymer (for example, by chitosan). In the
present work a low-hydroxylated fullerene has been used as a modifier and a cross-linking agent for polyvinyl alcohol.

It has been shown that the addition of fullerenol $C_{60}(OH)_{12}$ and definite amount of chitosan into PVA matrix leads to the significant change of physico-chemical and transport properties due to the changes in structure and morphology.

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