

The use of coal modified with alkyl-aryl layers for the preparation of heterogeneous asymmetric membranes

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Abstract

Coal surface is tethered with alkyl molecules by diverting the reactivity of aryl radicals derived from aryl diazonium salts during their reduction. Diazonium salts are reduced chemically by using potassium iodide or under sonication. [1] When we have used 4-nitrobenzene diazonium tetrafluoroborate salt and 3,5-bis-trifluoromethylbenzene diazonium tetrafluoroborate salts we obtained mixed alkyl-aryl layers grafted on coal surface. In order to prepare only alkyl layers we used 2,6-dimethylbenzediazonium salt, (2,6-DMBD) which does not graft due to steric hindrance but permits to abstract a halogen atom from alkylhalides and to generate alkyl radicals. [2-3] We have used 6-bromohexanoic acid as reagent that gives alkylcarboxylic radicals after the removal of bromine atom by 2,6-DMBD.

Modified coal is used to prepare heterogeneous asymmetric cellulose acetate modified coal membranes. In the past we have shown that coal modified with aryl layers issued from aryl diazonium salts have shown better performance than unmodified coal. [3] Here we show the results that we obtained with heterogeneous asymmetric cellulose acetate modified coal membranes where coal that was modified with alkyl layer. These membranes are prepared in the weight proportions (1:1.5) of cellulose and modified coal respectively. The reverse osmosis data confirm the improved performance of membranes (i.e. enhanced product rate and separation) of modified membranes. We obtained a high separation efficiency of up to 97 % and a product rate of 33.57g/h for the system NaCl-H₂O.

Keywords: tethered coal, aryl diazonium salts, 6-bromohexanoic acid, reverse osmosis, heterogeneous membranes

References

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