

Abstract

This study focused on the impact of ageing solution pH (200ppm TFC sodium hypochlorite) on the electrokinetic properties of a commercial PES/PVP UF membrane. PVP oxidation, leading to an increase in the negative charge density of aged membranes, was pointed out whatever the ageing solution pH although different mechanisms might be involved depending on the ageing pH. PES degradation was also demonstrated. Electrokinetic measurements highlighted the formation of functional groups with very weak acid properties on the surface of membranes aged in sodium hypochlorite at pH 8.0 and to a lesser extent at pH 6.0 and 11.5. These results were found to be consistent with the formation of phenol groups due to the radical hydroxylation of PES aromatic rings. Moreover, the disappearance of the isoelectric point of membranes aged in sodium hypochlorite at pH 6.0 and 8.0 gave evidence for the formation of strong acid groups such as sulfonic acids. These results suggested some PES-chain scissions, which was confirmed by XPS measurements. The disappearance of the isoelectric point was not observed for membranes aged in sodium hypochlorite at pH 11.5, thus indicating that ClO^- was not involved in PES-chain scissions for the ageing conditions considered in this work. Finally, electrokinetic measurements performed with the addition of tertbutanol (free radical scavenger) and thermo-oxidation experiments revealed for the first time that, although both HClO and free radicals species contributed to PES-chain scissions, HClO had the greater impact on PES degradation