

Impact of Prolonged Sodium Hypochlorite Cleaning on Silicon Carbide Ultrafiltration Membranes Prepared via Low-Pressure Chemical Vapor Deposition

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Abstract : Sodium hypochlorite (NaClO) is a common cleaning agent for ultrafiltration (UF) membranes. While its detrimental effects on polymeric membranes are well-documented, its impact on ceramic membranes remains less explored. This study investigates the chemical stability of silicon carbide (SiC) UF membranes prepared using low-pressure chemical vapor deposition (LP-CVD) during prolonged NaClO exposure. SiC UF membranes were fabricated via LP-CVD at two different temperature and pressure conditions. LP-CVD offers the advantage of SiC membrane fabrication at significantly lower temperatures (700-900°C) compared to conventional methods. The membranes were subjected to 200 hours of NaClO aging to assess their resilience. Before and after aging, we evaluated the properties and performance of the SiC UF membranes to identify optimal LP-CVD conditions. Our findings show that SiC UF membranes produced at 860°C via LP-CVD exhibit exceptional resistance to NaClO aging, whereas those prepared at 750°C experience significant deterioration. This highlights the crucial role of precise LP-CVD parameters in ensuring the robustness and long-term performance of SiC membranes in harsh chemical cleaning environments.

Keywords : ceramic membranes, ultrafiltration membranes, wastewater treatment, chemical vapor deposition

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