

Effect of Polyurethane/Rare Earth Composite Nanofibrous Membranes on Removal of VOCs from Air

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Abstract— With the development of economy and continuous reinforcement of globalization, people have paid more attention to green, health, safety, etc. high quality and comfortable life. Volatile organic compounds (VOCs) as one of air pollution, its existence directly affects the improvement of people's quality of life. So, it is increasingly important to find effective methods and techniques to reduce VOCs. In this study, we have synthesized the composite nanofibrous membranes of polyurethane (PU) and rare earth (RE) according to various RE contents. According to the weight ratio of RE to PU is 0, 10%, 30% and 50%, the composite nanofibrous membranes were denoted as PU/RE0, PU/RE10, PU/RE30 and PU/RE50, respectively. The results indicated that PU nanoparticles (NPs) and RE NPs can be well combined. In addition, the tensile strength of composite nanofibrous membranes decreased slightly with increasing RE content, from 10.63 MPa to 8.28 MPa. They can be sufficient used as a filter due to their tensile strength is above 8 MPa. On the other hand, the most common five kinds of VOCs (styrene, xylene, toluene, benzene and chloroform) were chosen as the main focus. The composite nanofibrous membranes showed a good VOCs absorption capacity with increasing the RE content, the VOCs absorption capacity of PU/RE50 is about 3 times than the pure PU membrane. It also showed an order of absorption of VOCs, is styrene, xylene, toluene, benzene and chloroform.

Index Terms— Absorption Capacity; Nanofibrous Membrane; Polyurethane; Rare Earth; VOCs