

### Preparation of PANI-*N*-VC Membranes

#### Preparation of PANI-*N*-VC Copolymer

A series of PANI-*N*-VC copolymers with different molar ratios were synthesized by emulsion polymerization. The reaction was carried out in a 250 mL three-necked round-bottom flask equipped with a magnetic stirring bar, a nitrogen inlet, and a reflux condenser. The polymerization was initiated by the addition of 5 mL of 10 wt % ammonium persulfate solution to a mixture of 3.45 g (0.01 mol) of aniline and 0.5 g of VC in 100 mL of deionized water. The reaction mixture was stirred at 30 °C for 2 h. After the addition of another 5 mL of 10 wt % ammonium persulfate solution, the mixture was stirred at 30 °C for another 2 h. The polymerization was continued until the solution turned from colorless to dark brown, indicating the formation of PANI-*N*-VC copolymer. The resulting copolymer was washed with deionized water and dried under vacuum at 40 °C for 24 h. The final product was PANI-*N*-VC copolymer with a molar ratio of 1:1.

#### Preparation of PANI-*N*-VC Membranes

PANI-*N*-VC membranes were prepared by casting a solution of PANI-*N*-VC copolymer in a suitable solvent onto a glass plate. The casting solution was prepared by dissolving 1 g of PANI-*N*-VC copolymer in 100 mL of a solvent mixture consisting of 50 mL of dimethyl sulfoxide (DMSO) and 50 mL of deionized water. The casting solution was stirred overnight to ensure complete dissolution of the copolymer. The solution was then poured onto a glass plate and allowed to dry naturally at room temperature for 48 h. The resulting PANI-*N*-VC membrane was removed from the glass plate and stored in a desiccator until use.