## 1. The synthesization steps of DADMAC and PolyDADMAC

In general, PolyDADMAC is manufactured in two consecutive steps: synthesization of monomer DADMAC and then polymerization of this monomer [25]. Meanwhile, the monomer DADMAC is synthesized by two chemical reactions of dimethylamine and allyl chloride. The dimethylamine is firstly alkylated by allyl chloride in an aqueous alkaline solution, followed by a quaternization step where the dimethylamine reacts with an extra amount of allyl chloride in an organic medium (Figure S1: a, b). PolyDADMAC has a unique chemical structure where it owns a long backbone of cyclic units resulting from the polymerization of DADMAC (figure S1: c).

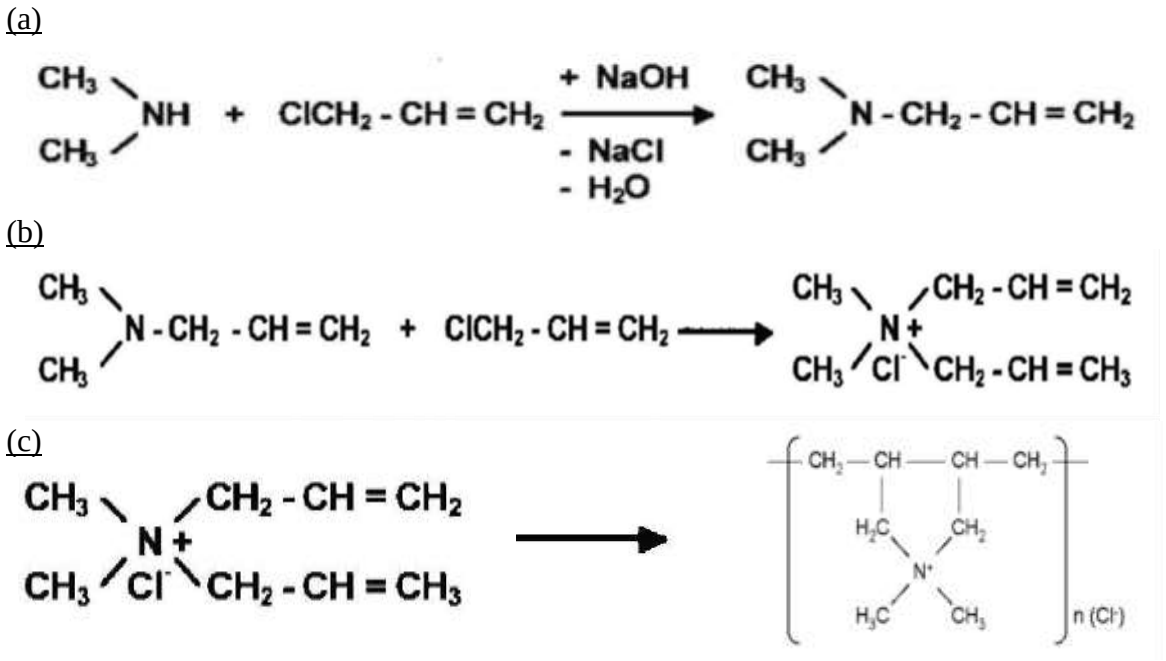


**Figure S1:** (a) The alkylation of dimethylamine with allylchloride [40], (b) Formation of DADMAC by quaternization of dimethylamine with extra allylchloride [40], and (c) Formation of PolyDADMAC by the polymerization of DADMAC [25]

## 2. Preparation of Draw Solutions

$$C_i X V_i = C_f X V_f \quad \text{(S1)}$$

where $C_i (g/mL)$ is the stock solution concentration. $V_i$ $(mL)$ is the required stock solution volume. $C_f$ $(g/mL)$ is the final solution concentration. And $V_f$ $(mL)$ is the final solution volume after dilution.

**Table S1:** Required volumes to prepare 2000 mL of draw solutions with various concentrations

| Final concentration g/mL | Required volume of stock DADMAC mL | Required volume of stock PolyDADMAC mL |
|---|---|---|
| 0.035 | 103.55 | 183.49 |
| 0.085 | 251.48 | 445.61 |
| 0.120 | 355.03 | 629.10 |
| 0.155 | 458.58 | 812.58 |