

# Sintesis dan Karakterisasi Hidrogel Responsif pH dan Temperatur P(DMAEMA-ko-DMA) serta Uji Potensinya sebagai Adsorben Ion Logam Berat: Pendekatan Kondisi Keringat = Synthesis and Characterization of pH and Temperature-Responsive P(DMAEMA-co-DMA) Hydrogel and Its Potential as an Adsorbent for Heavy Metal Ions: Sweat Condition Approach

Fanny Mourencia, author

Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=9999920549309&lokasi=lokal>

---

## Abstrak

Paparan logam berat dapat menimbulkan risiko atau dampak buruk bagi kesehatan manusia. Sebagian besar logam berat ini diekskresikan melalui keringat. Pada penelitian ini, disintesis hidrogel poli(2-(dimetilamino)etil metakrilat-ko-N,N-dimetilakrilamida) (P(DMAEMA-ko-DMA)) dengan variasi komposisi monomer melalui reaksi polimerisasi radikal bebas dengan amonium persulfat (APS) sebagai inisiator dan N,N'-metilenbis(akrilamida) (MBA) sebagai agen pengikat silang. Dilakukan karakterisasi FTIR dan uji swelling pada hidrogel hasil sintesis. Diketahui bahwa rasio swelling meningkat seiring dengan peningkatan komposisi monomer DMAEMA pada hidrogel. Hidrogel P(DMAEMA-ko-DMA) menunjukkan responsivitas terhadap pH dan temperatur, ditunjukkan oleh tren penurunan rasio swelling seiring dengan peningkatan pH dan temperatur. Hidrogel kopolimer dengan komposisi DMAEMA terbesar memiliki rasio swelling tertinggi pada rentang pH dan temperatur keringat. Selain itu, hidrogel P(DMAEMA-ko-DMA) dapat digunakan sebagai adsorben ion logam berat Cd(II) dan Pb(II) pada kondisi keringat, baik dalam larutan tunggal maupun multikomponen. Kapasitas adsorpsi ion logam berat Cd(II) > Pb(II), dan kapasitas adsorpsi meningkat seiring dengan penurunan temperatur. Semakin tinggi konsentrasi awal larutan logam berat, semakin banyak ion logam berat yang dapat teradsorpsi.

.....Heavy metal exposure may pose risks or adverse effects to human health. Most of these heavy metals are excreted through sweat. In this research, poly(2-(dimethylamino)ethyl methacrylate-co-N,N-dimethylacrylamide) (P(DMAEMA-co-DMA)) hydrogels with variations in monomer composition were synthesized through a free radical polymerization reaction with ammonium persulfate (APS) as the initiator and N,N'-methylenebis(acrylamide) (MBA) as the cross-linking agent. FTIR characterization and swelling ability tests were conducted on the synthesized hydrogels. It was observed that the swelling ratio increased with an increase in the DMAEMA monomer composition in the hydrogel. The P(DMAEMA-co-DMA) hydrogels exhibited responsiveness to pH and temperature, as indicated by a decreasing trend in the swelling ratio with increasing pH and temperature. The copolymer hydrogel with the highest DMAEMA composition showed the highest swelling ratio within the range of sweat pH and temperature. Furthermore, the P(DMAEMA-co-DMA) hydrogel could be utilized as an adsorbent for heavy metal ions Cd(II) and Pb(II) under sweat conditions, both in single and multicomponent solutions. The adsorption capacity for Cd(II) ions was greater than that for Pb(II) ions, in addition, the adsorption capacity increased with a decrease in temperature. The higher the initial concentration of heavy metal solution, the more heavy metal ions can be adsorbed.