

SOCIETY OF PHYSICS STUDENTS (SPS) EVENT

Tylenol Loaded hydroxypropylcellulose Microgels

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Abstract:

Microgel nanoparticles consisting of cross-linked polymer (hydroxypropyl cellulose, HPC) chains have a temperature dependent volume phase transition, a property which prompts investigation of microgels as a controlled drug transport mechanism. HPC is a polysaccharide FDA approved for human consumption. Slightly hydrophobic interior of microgels is expected to attract small molecule drug particles at temperatures below the phase transition. These particles are stored in equilibrium until the critical temperature (T_v) is reached and the volume phase transition limits available space, thus expelling the drugs. Our study was designed to test this property of microgels using amperometric electrochemical methods. A critical assumption was that small molecules inside microgels would not interact via diffusion with the electrode surface and thus total current would be decreased across the electrodes in a microgel sample. A room temperature (T_{room}) flow amperometric measurement comparing microgel infused tylenol solution with control tylenol samples yielded about 20% tylenol concentration reduction of the microgel sample. Results from the steady state electrochemical experiment confirm the presence of about 20% tylenol concentration drop of the microgel sample compared to control sample at T_{room} . Using the steady-state experiment with a cyclic temperature ramp from T_{room} to beyond T_v showed that the tylenol concentration change between the temperature extremes was more significant for the microgel solution than for the control solution.

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