Polymeric Microcapsules for Drug Delivery

Younis Abu-Ain, Hasan Sawalha and Mohammed Suleiman

Department of Chemistry, An-Najah National Universit, Palestine.

Abstract

Poly dl-lactide co-glycolide (PLG) is a biodegradable polymer that has a slow degradation rate and high permeability to small drug molecules. PLG microcapsules were prepared by emulsifying a polymer solution that consists of PLG/solvent (dichloromethane) into a continuous phase that consists of a nonsolvent solution (water and SDS as a surfactant). After emulsification, the solvent diffuses out of polymer droplets (liquid microcapsules) to the nonsolvent solution and then evaporates at the surface of the nonsolvent to the air, leaving behind it solid microcapsules, these microcapsules are centrifuged and dried to obtain microcapsules as powder. The encapsulation of the limonene within the polymer microcapsules was prepared, and limonene release was determined with time from polymer microcapsules prepared. The current study aims at studying the effect of the type of the nonsolvnet such as (SDS solution, methanol and ethanol) on the limonene release from polymer microcapsules. The drug release from the solid microcapsules was measured using spectroscopic techniques. The size of microcapsules was analyzed by optical light microscope. The PLG microcapsules were prepared using different concentrations of SDS solution, methanol, and ethanol and study of its impact on the size of the PLG microcapsules. The size of prepared microcapsules was measured by the light microscope. Our results show that as the concentration of nonsolvent increases in the process of preparing of PLG microcapsules the size of prepared microcapsules decreases and the limonene release increases from polymer

microcapsules with decreasing the size of microcapsules. These results can be explained as follows: with increasing the concentration of methanol, ethanol or SDS, the viscosity of the nonsolvent increases and the interfacial tension decreases which increases the shear force applied on the droplets during emulsification. This lead to a decrease in size of obtained PLG microcapsules and smaller microcapsules are obtained. The increase in the concentration of SDS solution decreases the size of PLG microcapsules and the surface area-to-volume ratio of the microcapsules consequently increases thus the diffusion flux of limonene from microcapsules increased.