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PREPARATION OF poly (3-hydroxybutyrate-co-3-hydroxyvalerate) (PHBV) NANOPARTICLES FOR THE SUSTAINED RELEASE OF FOLIC ACID

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Biodegradable polymers are predominantly used in a variety of biomedical and food applications. Specially poly(3-hydroxybutyrate-co-3-hydroxyvalerate) (PHBV) co polymer particles have been studied as a food packing material and as a material for drug delivery with a controlled release both *In vivo* and *In vitro*.

In this project PHBV particles containing a water soluble model drug (Folic acid), were obtained by the double emulsion/solvent evaporation technique. Folic acid was encapsulated into PHBV polymer matrix by means of homogenization of aqueous and organic phases. Several samples were prepared in order to observe the effect of each composition on the encapsulation efficiency, and Drug loading. The concentration of folic acid in water was changed to obtain particles with different ratios of PHBV and Folic acid. These particles were obtained by using Polysorbate 80(tween80) as a surfactant and polyvinyl alcohol (PVA) as a film forming agent in primary and secondary emulsions respectively.

Particle production conditions were varied in order to investigate the influence of the mixing conditions on the particle size. The primary emulsion formation step was done using mechanical stirrer equipped with blade impellers. Using a hand sprayer and an atomized sprayer apparatus several sets of samples were prepared by varying the addition method of inner aqueous phase on to the oil phase. An ultrasonic bath was used to obtain smaller particles. In order to observe the resulting particles and to obtain an idea about the particle size distribution, all the samples were monitored using an optical microscope and were compared with standard min-u-sil (1~micron diameter) particles.

The obtained particles were non-agglomerated, uniform and with particle size in nanometer and micrometer range. Particles obtained by using atomized sprayer apparatus and ultrasonic bath with mechanical stirrer had a mean diameter of less than 1 micrometer, whereas the particles obtained by hand sprayer method had a mean diameter of 1 micrometer. The samples were further characterized using Infrared Spectroscopy (IR) and Ultraviolet Spectroscopy. IR spectroscopy results suggested that no chemical bond between the polymer and the drug was formed. *In vitro* drug release demonstrated the influence of PHBV on the dissolution profile of Folic acid. It was observed that in pH 7.4 buffer solution, folic acid was released over a period of 22 days.