Alginate microparticles produced by atomization system: Biomedical applications

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Nowadays, biomedical technologies must use biocompatible and biodegradable materials in order to avoid side effects. In this context, natural polymers play an important role. Alginate is a biomaterial of great interest to use for biomedical purposes. It has also shown to be an attractive vector for the controlled release of drugs or cells [1], due to its low immunogenicity level, biocompatibility, low toxicity and low cost [2]. Alginate has the ability to form hydrogels under mild aqueous conditions of divalent cations such as Ca^{2+} or Ba^{2+}. Alginate microparticles was produced by atomization system [3]. In this technique, alginate solutions were introduced into a pressurize tank. Two important parameters were liquid and air pressures. Due to the effect of liquid pressure, alginate solution flows from the container through a nozzle. On the other part of the nozzle, air is introduced from an air cylinder and breaks the jet of alginate in small droplets. These droplets are sprayed into a divalent solution under magnetic stirring. The main objective of this study was to compare between two types of alginate gels formed with divalent ions and secondly, production of alginate microparticles with the atomization system. Alginate solutions at different concentrations (0.5% w/v to 2% w/v) and alginate gels were characterized by a rheometer AR 1500 ex (TA Instruments, Spain). Microparticles were produced by electrostatic interactions between barium chloride with sodium alginate. The size (d 0.5) of particles ranges from 40 – 200 µm and Zeta potential was negative (- 8.60 mV). So, these residuals carboxylate groups are responsible of negative charge of particles. In addition, these groups can be used to join drugs or another polymer with polymer charge, such as chitosan [4]. As a result of this research, we showed microparticles more stables in time which may have special interest to the use of them as vectors or in drug delivery formulations.

REFERENCES

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FIGURE

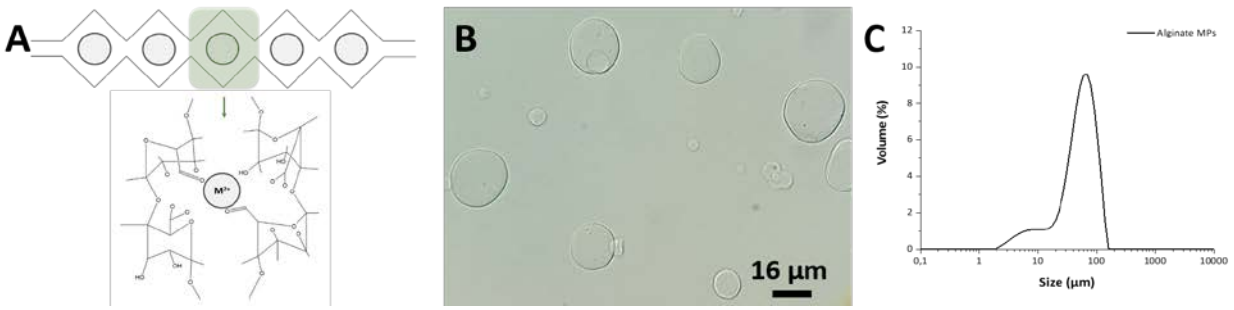

Figure 1: A) Schematic representation of the interactions between alginate and divalent ions; B) Alginate – BaCl2 microparticles produced by atomization system; C) Size distribution obtained by Mastersizer2000.