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Various Approaches for the Formulation of Nanocapsules

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A review of the state of knowledge on nanocapsules prepared from preformed polymers as active substances carriers is presented. Other advantages of nanoencapsulated systems as active substance carriers include high drug encapsulation efficiency due to optimized drug solubility in the core, low polymer content compared to other nanoparticulated systems such as nanospheres, drug polymeric shell protection. This entails a general review of the different preparation methods: nanoprecipitation, emulsion-diffusion, double emulsification, emulsion-coacervation, polymer-coating and layer-by-layer, from the point of view of the methodological and mechanistic aspects involved, encapsulation of the active substance and the raw materials used. Similarly, a comparative analysis is given of the size, zeta-potential, dispersion pH, shell thickness, encapsulation efficiency, active substance release, stability and in vivo and in vitro pharmacological performances, using as basis the data reported in the different research works published. Nanoencapsulation is an attractive strategy for the vectorization of a variety of active substances. Consequently, the information obtained allows establishing criteria for selecting a method for preparation of nanocapsules according to its advantages, limitations and behaviours as a drug carrier. On the other hand, the nanoencapsulation strategies such as polymer-coating and the layer-by-layer technique have shown interesting results, particularly in relation to in vivo nanocapsule behaviours since the final nanocapsule positive charge reduces their enzymatic degradation.