

Fat Coating of hygroscopic drugs by spray-drying and fusion in order to protect them from air humidity

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Abstract

Hygroscopicity is the tendency of a dried substance to absorb moisture from the ambient atmosphere. By taking on the humidity present in the air, a hygroscopic substance can be physically and chemically altered by local dissolution, irreversible aggregation or modifications of its cohesive properties. Other kinds of modifications can be observed on final pharmaceutical forms containing hygroscopic substances: growth of granule size, weight uptake and breaking out of tablets. The effects of air humidity on hygroscopic substances are thus one of the most important factors to be considered in developing their formulation and a way to protect the hygroscopic substance from its surrounding must be foreseen.

One of the methods used to protect these substances is to coat them by using hydrophobic excipients. Hydrophobic properties can be found with hard fat and suppository bases which are in a solid state at ambient temperature. To allow the substance release without depending on pH conditions, two groups of fats can be used. The first have a melting point of 37°C (e.g. suppocire), and will release the active substance after melting into their liquid form at a temperature equal to the human body. The second kind of fats is used to prepare water-in-oil (W/O) solid pre-microemulsions (e.g. gelucire), which forms W/O microemulsion in contact with gastrointestinal fluids. The hard fats are added on the hygroscopic substance by fusion. The dried powder and the solid fats are mixed in a blender fitted with a heating system at the lipid base's melting temperature. The fat will thus progressively go from the solid state to the liquid state, will coat the substance and protect it from the air.

Coating can also be realized by spray drying. Lipophilic substances (e.g. stearic acid) are added in the solution, containing the active substance in liquid form and a solid support. The solution is ready to be dried. This excipient can be dissolved in the mixture, leading to the formation of a suspension or a microemulsion. By spray-drying in optimal conditions of temperature heating and rate flow, the solution will form a thin powder made of structured particles: a dried active substance absorbed on a solid support wrapped by a lipophilic coating agent. The dried substance is protected from the ambient moisture by a hydrophobic barrier without decreasing the release of the substance.