

Encapsulation of Rosemary Oil: Mini Review



Pragya C Sahare and Chandu S Madankar*

Department of Oils, Oleochemicals and Surfactants Technology, Institute Of Chemical Technology, India

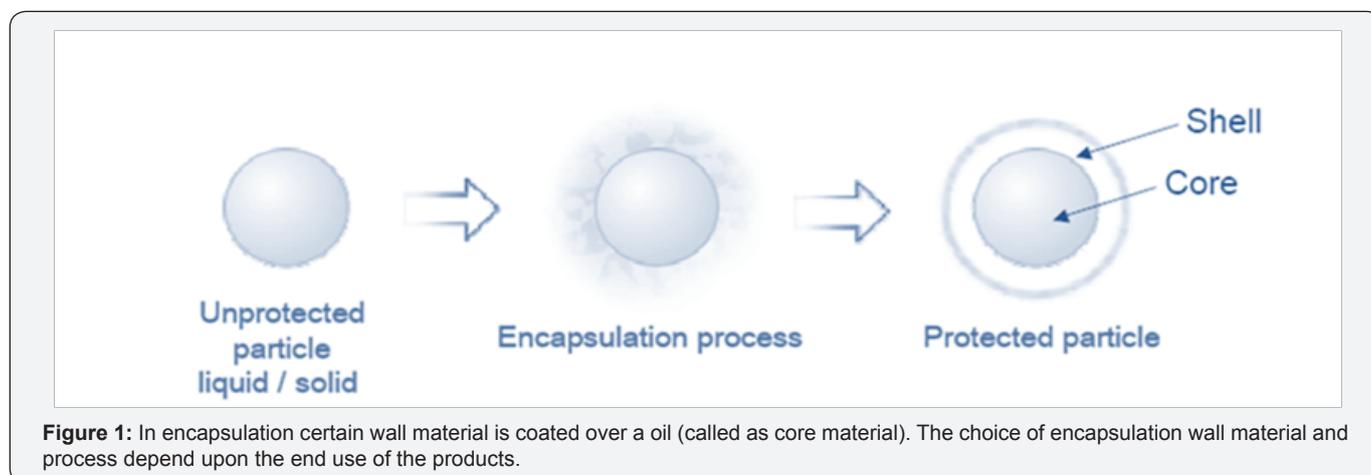
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*Corresponding author: Chandu S Madankar, Department of Oils, Oleochemicals and Surfactants Technology, Institute of Chemical Technology, Mumbai, - 400019, India, Tel: +91-22-3361 2557; Fax: +91-22- 3361-1020; Email: chandumadankar@gmail.com

Mini Review

Rosemary is a medicinal plant which has a volatile component in it. These components can be extracted from the herb in the form oil. The volatile nature, activity of oil with oxygen and light may lead to degradation of essential oil. Thus to protect oil from environmental condition, encapsulation of rosemary oil is effective method. In encapsulation certain wall

material is coated over a oil (called as core material). The choice of encapsulation wall material and process depend upon the end use of the products. This encapsulated oil has found broad application in foods, beverages and pharmaceuticals products for active delivery of active components. This review describes the encapsulation of rosemary oil, its formulation technique and application in different fields (Figure 1).



Rosemary is the medicinal plant belongs to the mint family "Lamiaceae". The botanical name of rosemary is *Rosmarinus officinalis* [1]. Rosemary is a woody, perennial herb with fragrant, evergreen, needle-like leaves. Rosemary flourishes in alkaline soil and prefers sunny condition but at the same time needs shelter from gusty winds. The plant reaches about 1.5-3 meters in height. The plant parts; flowers and leaves have fragrance that is pungently aromatic and somewhat camphoraceous (camphor-like).

The rosemary oil can be extracted from fresh or dried herbs using distillation, supercritical extraction methods. The conventional steam distillation process gives the high and purest quality of oil. Rosemary has interesting and unique health

benefit i.e. the ability to boost memory, improve mood, reduce inflammation and pain, detoxify the body, stimulates circulation, prevent premature aging, protect the body from bacterial infection and heal skin condition. This species is considered to be most important source of both volatile and nonvolatile bioactive compounds. The chemical composition of various compounds present in rosemary depends on different conditions like regional, environmental and agronomic conditions, the time of harvest, the stage of development of plants [2]. The major components in oil are cineol, β -Pinene, Myrcene, Camphene, borneol, α -terpineol, bornyl acetate, etc [3,4].

Essential oil from rosemary can be use in cosmetic and pharmaceutical products. There are various researches also

going on as a food preservative and food flavor ingredient [5]. It can also be used as natural pesticides and insecticide [6]. Since essential oils are volatile components, it is necessary to formulate them to minimize the evaporation and protect the oil from high temperature, oxidation and UV light. This will help in shelf life of the oil and the selective release of essential components. Microencapsulation of rosemary oil improved functional activity with high retention of volatiles, preserve oil from degradation and thus chemical composition of oil remains unchanged [7].

Encapsulation of essential oil is a process in which liquid components or gaseous materials (core material) are entrapped in a wall material which protects the core material from environmental factors. This technique also helps to prevent evaporation of volatile components and oxidation of ingredients present in it [8]. There are three main types of encapsulated products based on the size roughly divided into macro-coated powder (larger than 0.1mm), microcapsules (size in the range of 0.1-100µm) and nanocapsules (size smaller than 0.1µm). To coat any core material different matrix materials can be used like polysaccharides & sugar (gums, starches, celluloses, cyclodextrin, dextrose), protein (gelatin, soyprotein), lipids (waxes, paraffin, oils, fats etc), inorganic (silicates, clays, calcium sulphate) and synthetic polymer (acrylic polymer) etc. The encapsulated materials may have different shapes such as spherical, oblong or irregular and can have single or multiple walls. There are different methods to achieve encapsulated products. Besides this choice of wall material, homogenization and drying techniques play an important role. In the literature there are various works on rosemary oil and its components but only few researches on encapsulation of rosemary essential oil.

Formulation of encapsulated oil has various routes such as spray drying, spray cooling, extrusion, emulsion and interfacial polymerization, liposomes etc. Spray drying is widely used and effective method in encapsulation for large scale application. This method gives a wide choice of carrier material, good stability of end product. The process involves the dispersion of the core material to be encapsulated in a wall material. Dispersion of materials is followed by atomization and spraying of the mixture into a hot chamber. Spray cooling is least expensive where actives mixed with wall material and atomized using cool air. Encapsulation using extrusion is mainly described for glossy carbohydrate matrix. The glossy carbohydrate such as starch and malt dextrin are melted at elevated temperature and low water content and intensively mixed with the active in extrusion barrel. Liposomes mainly use in pharmaceuticals and cosmetics application. It forms a membrane like vesicle which slows down selective permeability for small molecules. This process cost high.

There are various literatures on encapsulation of rosemary oil with malt dextrin and whey protein [8,9]. The objective of this work is to suggest different matrix material. So, focus on maltodextrin and acacia gum as a wall material for encapsulation. For encapsulation using these materials, wall material solution prepared with distilled water in different ratio. The solution was premixed using high speed homogenizer for 10min and then left in shaking water bath for one night at 120rpm to obtain full hydration. Both maltodextrin and acacia gum solution is separately prepared. After keeping it for one day both wall material and rosemary oil is mixed to form an emulsion with addition of few drop of Surfactant (Tween 20). The homogeneous mixture prepared using high speed homogenizer followed by spray drying to get to encapsulated powder. Maltodextrin and acacia gum was used as a coating material since it has an excellent oxygen blocking property but it lacks in emulsification characteristics thus need an addition coating material. This is the alternative for the preparation of encapsulation rosemary oil. Thus there is a greater need to study this process for high yield and efficiency of the end product.

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