

# Emulsion Based Systems: Revolutionizing the Delivery of Food Active Compounds

Emulsions, a blend of two immiscible liquids, have emerged as a game-changer in the world of food science and technology. As a powerful delivery system, emulsions offer a unique approach to encapsulating, protecting, and delivering food active compounds, unlocking their full potential.

## The Science Behind Emulsions

An emulsion is a dispersed system where one liquid (the dispersed phase) is suspended within another (the continuous phase). The stability of an emulsion relies on emulsifiers, substances that prevent the droplets from coalescing. These emulsifiers can be naturally occurring, such as proteins or phospholipids, or synthetic, such as polysorbates or tweens.



## Emulsion-based Systems for Delivery of Food Active Compounds: Formation, Application, Health and Safety

by Tony Pollard

★★★★★ 5 out of 5

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Emulsions can be classified based on the size of their droplets: macroemulsions, with droplets larger than 100 nm, and nanoemulsions, with droplets smaller than 100 nm. Nanoemulsions possess unique properties due to their extremely small droplet size, including increased stability, reduced creaming, and enhanced bioavailability.

## **Applications in Food Delivery**

Emulsion based systems have found wide-ranging applications in food delivery, offering numerous advantages:

- **Enhanced Bioavailability:** Emulsions can protect sensitive food active compounds from degradation and improve their absorption in the gastrointestinal tract.
- **Increased Stability:** Emulsions provide a protective barrier, preventing oxidation, degradation, and other factors that can reduce the shelf life of active compounds.
- **Targeted Delivery:** By modifying the properties of the emulsion, it is possible to control the release and targeting of active compounds to specific areas of the body.
- **Versatility:** Emulsions can be tailored to encapsulate a wide range of food active compounds, from vitamins and minerals to nutraceuticals and probiotics.

## **Examples in Functional Foods**

Emulsion based systems are being increasingly incorporated into functional foods, which provide health benefits beyond basic nutrition:

- **Fortified Dairy Products:** Emulsions are used to deliver vitamins, minerals, and antioxidants to milk, yogurt, and cheese, enhancing their nutritional value.
- **Omega-3 Enriched Foods:** Fish oil emulsions are incorporated into food products to provide essential omega-3 fatty acids, supporting brain and heart health.
- **Probiotic Delivery:** Emulsions protect and deliver probiotics to the gut, promoting a healthy microbiome and improving digestion.

## Future Prospects

The field of emulsion based systems for food active compound delivery is rapidly evolving, with ongoing research exploring:

- **Novel Emulsifiers:** Developing new and improved emulsifiers to enhance stability, bioavailability, and targeted delivery.
- **Controlled Release Systems:** Designing emulsions that can release active compounds over a sustained period or in response to specific triggers.
- **Multi-functional Emulsions:** Creating emulsions that can deliver multiple active compounds with different properties and release profiles.

Emulsion based systems are transforming the delivery of food active compounds, offering a versatile and effective means to enhance bioavailability, increase stability, and achieve targeted delivery. As research continues to advance, we can anticipate even more innovative and

sophisticated applications of emulsions in the future, unlocking the full potential of food active compounds to promote health and well-being.



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