



A Guide to Emulsifiers for Cake Products



The primary function of emulsifiers in cakes is to improve the overall quality and consistency of the finished product. Emulsifiers can help mix ingredients homogeneously and create an even distribution in the batter, improving the cake's final appearance and texture while reducing the mixing time. They can also enhance the blending and processing properties of the batter, making it easier to work with and resulting in a consistent final product.¹

These ingredients often contain hydrophobic and hydrophilic ends that link to oil and water, respectively. Therefore, they help bind together two immiscible substances, such as oil and water or water and air¹⁷. This leads to the formation of a stable, consistent mixture.

No Whisk,
All Reward



Vantage | Food

Kake Mate

Emulsifiers in Cake

Cakes are complex mixtures that typically contain oil and water-based ingredients and form air and water-based foams that are naturally incompatible. The most common examples of incompatible ingredients include water, butter, and milk. Emulsifiers decrease the surface tension between these ingredients, allowing them to blend more quickly and develop a stable emulsion.

Proper emulsification aids in improving the sensory properties by improving the texture and structure of the cake. Emulsifiers also help incorporate more air into the batter and improve the aeration, resulting in a lighter and fluffier cake with a larger volume rising evenly and not collapsing upon itself.

In addition, emulsifiers can help to increase the product shelf life of baked goods by slowing down the staling process. Cakes incorporate moisture that slowly evaporates, leading to modifications in the texture, flavor, and overall quality of the cake over time. Emulsifiers aid in delaying this staling process by keeping the ingredients evenly distributed and lowering the moisture migration rate in drier parts. It helps keep the cakes soft and fresh for longer.²



Looking for an ideal emulsifier for your cake? Kake Mate from Vantage Food is a versatile emulsifying solution that promotes even, consistent baking, ideal crumb structure, and superior operational tolerance, formulated specifically for cakes and sweet goods. [Check it out!](#)

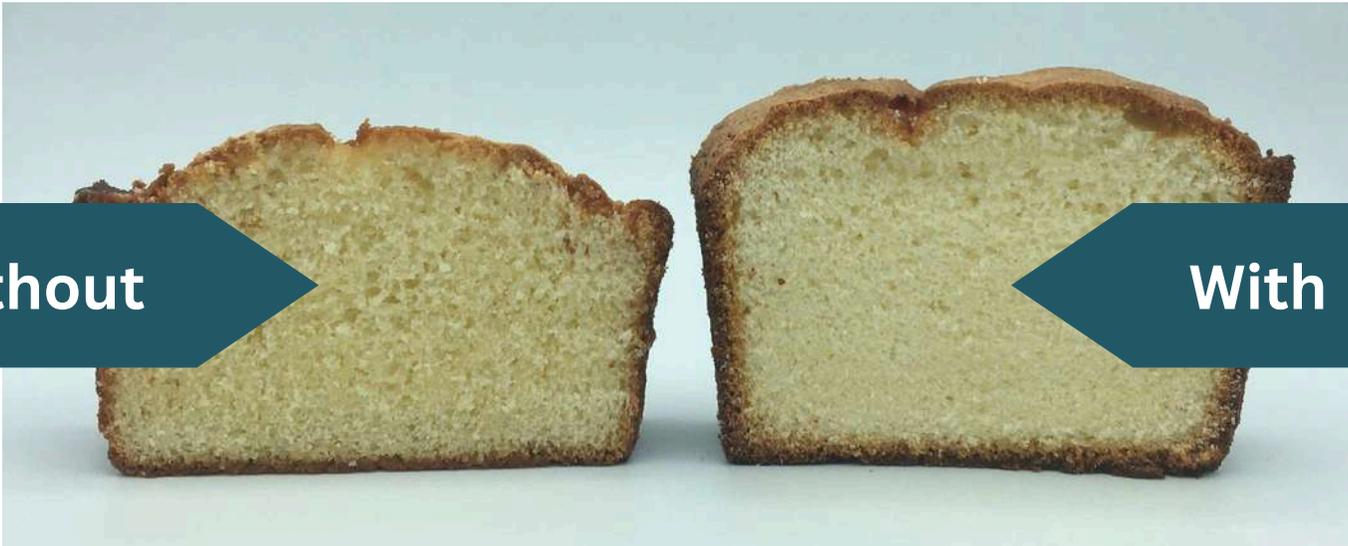
Types of Emulsifiers

Conventional emulsifiers used in cake baking include:

- ✓ Mono- and Diglycerides
- ✓ PGE (Propylene Glycol Esters)
- ✓ PGME (Propylene Glycol Monoesters)
- ✓ Sorbian Esters
- ✓ Polysorbates

Often, different emulsifiers are used concurrently in cake baking to attain a synergistic result that enriches the emulsifying properties, improving the overall quality of the cake.

Some emulsifiers work better with specific ingredients, while others have a more versatile functionality. Combining emulsifiers helps overcome possible limitations or drawbacks of respective emulsifiers, such as a limited pH range or stability. However, it is essential to note that different emulsifiers may interact unexpectedly and should be tested for optimal performance.



Without

With

*The cake on left contains no emulsifiers, while the cake on right is made with the emulsifier **Kake Mate**, from **Vantage Food**.*

CLEAN LABEL EMULSIFIERS

The clean label trend in cakes comes from the increasing market for products made with more straightforward and natural ingredients. Consumers desire cakes free from artificial additives and preservatives. This trend has led to new clean-label emulsifiers for cake formulations, including stabilizers, that don't compromise quality, texture, or shelf-life. Some common clean-label emulsifiers include:

- **Lecithin:** improves mixing and stability while raising volume.
- **Egg White Protein:** is an excellent emulsifier with a wide application in the baking industry to form a stable foam (air in water emulsions), leading to a lighter and fluffier cake texture and well-mixed batter (oil in water emulsion) formation.
- **Whey Protein Concentrate:** can also act as an emulsifier by forming a stable emulsion that can improve cake products' texture and shelf life.
- **Pea Protein:** with the increasing demand for plant-based vegan foods, pea protein is used for its food emulsification properties to form a stable emulsion by surrounding oil droplets, creating a moist and tender cake texture.
- **Soy Protein Isolate:** another plant-based clean-label emulsification substitute, this can act as a partial emulsifier by binding to fat droplets, which can help improve the texture and structure of cakes.
- **Gums:** acacia gum, xanthan gum, guar gum, or locust bean gum are commonly used as stabilizers. Gums enhance the structure, texture, and mouthfeel of cakes while preventing ingredient separation.
- **Pectin:** acts as a gelling agent and stabilizer, improving the texture and consistency of cakes and contributing to shelf life.
- **Agar:** is a vegan and natural emulsifier that helps stabilize the cake batter and improve its texture.
- **Chia Seed Gel:** a vegan and natural emulsifier that helps stabilize the cake batter and improve its texture.

TIP: Plant-based protein ingredients have lower functionality than animal-based proteins. So, it's best to combine these emulsifiers for synergistic effects.

Icing Stabilizers



Emulsifiers are also used in icing and frosting to stabilize the emulsion and prevent phase separation of water and fat separation. Maintaining consistency and structure in the icing or frosting is vital. Commonly used emulsifiers include mono- and diglycerides, lecithin, and polysorbates. Clean-label emulsifiers, similar to cake emulsifiers, include egg whites, whey proteins, aqua fava, lecithin, and gums.

Also, emulsifiers can improve the aeration and volume of whipped icings and frostings, resulting in a smoother and more uniform appearance.



Vantage Food's Perma Frost Stabilizer allows you to create eye-catching icings and glazes without cracking, separation, or weeping. It offers rapid drying and extended shelf life for efficient performance even under extreme conditions. [Learn more here.](#)



No Whisk,
All Reward

 **Vantage** | Food

Kake Mate

 **Vantage** | Food

Troubleshooting Cake Emulsifiers



What emulsifier makes an eggless cake soft, light and fluffy?

A premixed emulsifier combination, such as Kake Mate from Vantage Food, contains emulsifiers such as sorbitan monostearate, monoglycerides and polysorbate 60 that work in synergy due to their excellent hydrophilic-lipophilic balance. Furthermore, a combination of emulsifiers like PGME, mono- and diglycerides (MDGs) lecithin and stabilizers such as xanthan gum and guar gum are commonly used in eggless cake formulations to improve the texture and volume of the cake. These emulsifiers help to produce a finer and more consistent crumb structure with uniform ingredient distribution, enhancing the aeration of the cake batter by stabilizing air bubbles, resulting in a softer, lighter, and fluffier cake.



How do you incorporate emulsifiers into a formulation?

1. **Determine the required functionality:** identify the necessary functionality and consider the kind of cake, preferred texture, and required shelf life.
2. **Select appropriate emulsifiers:** select the suitable emulsifiers that can provide the desired functionality. Kake Mate offers a range of emulsification solutions ideal for cake baking.
3. **Determine the usage level:** the usage concentrations of the chosen emulsifiers are often fine-tuned through trial and error, initiating with the recommended dosage provided by the manufacturer and calibrating as necessary.
4. **Incorporate the emulsifiers into the recipe:** adjust the ratios of other ingredients while maintaining the desired texture and flavor profile.
5. **Conduct sensory evaluation and shelf life study:** conduct a sensory evaluation on the product developed with the new formulation to ensure the desired texture and flavor profiles. Furthermore, a shelf life comparison of the new formulation to the older formulation can help understand product properties over a prolonged period.
6. **Next steps:** make modifications if the desired target still needs to be achieved. Once the preferred properties are achieved, the recipe can be scaled up to the production process.



Which emulsifier can help with shelf life and freshness?

The commonly used emulsifiers in cake formulations are PGMEs and polysorbate 60, along with the other emulsifiers discussed in the article above. Often, it is suggested to use different emulsifiers in combination to achieve a synergistic effect. Some premixed emulsifiers, such as Kake Mate and Proform CS, are also available that have been specifically developed with cake emulsification in mind to provide extraordinary sensory properties and a long shelf life.

Conventionally, these emulsifiers are used on a large scale for their ability to bind free moisture, prevent staling, and delay mold and bacteria growth by reducing the product's free water, increasing the cake's shelf life.



Can emulsifiers help with stabilizing icings and frostings?

The texture and stability of frostings are improved by using emulsifiers. These additives enhance the emulsion stability of oil-in-water emulsions. The most common examples are mono- and diglycerides, which can prevent separation and improve the consistency of the final product. Apart from this, emulsifiers like PGE (propylene glycol esters of fatty acids) and PGPR (polyglycerol polyricinoleate) can aid in improving the texture and spreadability of the frosting.

In the case of frozen icing, the icing is a mixture of fat and water that tends to phase separately on freezing and thawing. This results in gritty ice structure formation instead of a smooth microstructure. Emulsifiers, such as sorbitan monostearate, Polysorbate, and MDGs, help to keep fat suspended by forming a layer around fat and reducing the rate and amount of ice formation resulting from access to available free water, creating a smoother and more stable product.



References

1. Cauvain, S. P. (2020). Flour lipids, fats, and emulsifiers. In *Breadmaking* (pp. 169-185). Woodhead Publishing.
2. Humble, N. (2010). *Cake: A global history*. Reaktion Books.
3. <https://bakerpedia.com/ingredients/lecithin/>
4. <https://bakerpedia.com/ingredients/acacia-gum/>
5. <https://bakerpedia.com/ingredients/xanthan-gum/>
6. <https://bakerpedia.com/ingredients/pectin/>
7. <https://bakerpedia.com/ingredients/guar-gum/>
8. <https://bakerpedia.com/ingredients/agar/>
9. Chavan, V. R., Gadhe, K. S., & Kale, R. V. (2017). Studies on extraction and utilization of chia seed gel in cupcake as an emulsifier. *Trends in Biosciences*, 10(20), 3986-3989.
10. Riaz et al. (2022). Natural Emulsifiers as Clean Label Ingredients. In *The Age of Clean Label Foods* (pp. 37-72). Cham: Springer International Publishing.
11. Abu-Ghoush et al. (2010). Comparative study of egg white protein and egg alternatives used in an angel food cake system. *Journal of Food Processing and Preservation*, 34, 411-425.
12. Díaz-Ramírez et al. (2016). Effect of whey protein isolate addition on physical, structural and sensory properties of sponge cake. *Food Hydrocolloids*, 61, 633-639.
13. Paraskevopoulou et al. (2015). Quality characteristics of egg-reduced pound cakes following WPI and emulsifier incorporation. *Food Research International*, 69, 72-79.
14. Shah et al. (2019). Hydrophobically modified pea proteins: Synthesis, characterization and evaluation as emulsifiers in eggless cake. *Journal of Food Engineering*, 255, 15-23.
15. Lin et al. (2017). Development of eggless cakes suitable for lacto-vegetarians using isolated pea proteins. *Food Hydrocolloids*, 69.
16. Lin et al. (2017). Replacement of eggs with soybean protein isolates and polysaccharides to prepare yellow cakes suitable for vegetarians. *Food Chemistry*, 229, 663-673.
17. https://www.youtube.com/watch?v=DHq_ENI6NOE



Sponsored by Vantage Food. Vantage Food is a market leader offering customized solutions, in-house research and development, and an extensive portfolio of food processing ingredients. Their offerings include release agents, emulsifiers, stabilizers, processing aids, shortenings, esters, polysorbates, antifoams, specialty ingredients, spraying equipment, and much more. Also, they offer a full line of clean label solutions including allergen-free, non-GMO, organic, Kosher, and Halal. [Learn more!](#)