

## What Works Best for Oil Separation Problem?

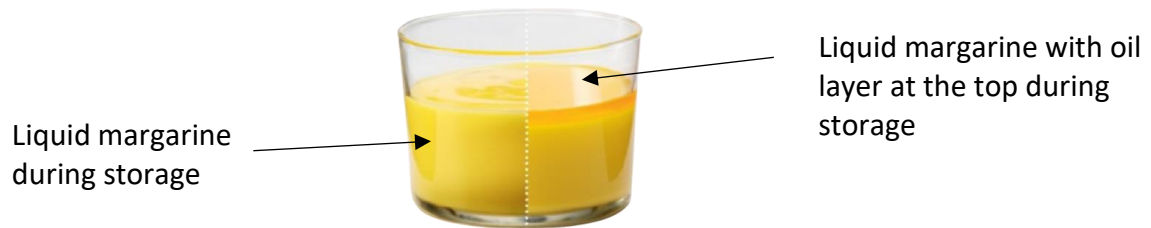


### Why Is There a Layer of Oil On Top of Liquid Margarine?

Have you ever seen there is a floating layer on top of liquid margarine? No matter how much you stir, oil droplets will still float to the top. Let's find out!

### What is oil separation?

Oil separation occurs when a product shows a layer of oil on the surface and a dry layer at the bottom during a storage period<sup>2</sup>. It is normally happened when producing soft and oil-containing product such as margarine or spreads<sup>2</sup>. This separation of oil in margarine signs a poor quality of finished product<sup>3</sup>.



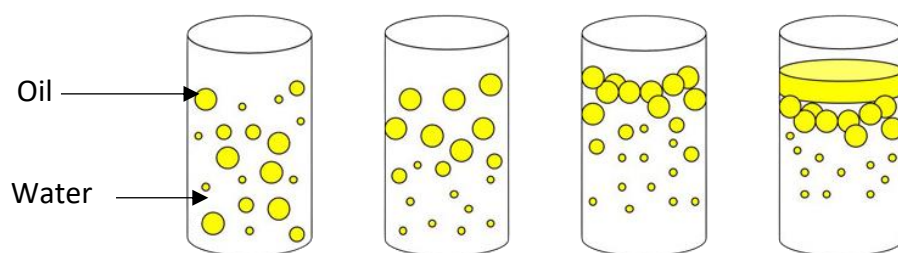
*Source: Palsgaard, 2018*

### Why cause oil separation?

Oil separation occurs due to absence of stabilizer. Oil separation leads to lipid peroxidation and will lead to off-flavours development and results in rancidity. Oil separation may also affect textural quality of fat spread in terms of spreadability<sup>4</sup>.

### What is an emulsion and how does emulsifiers work?

An emulsion can be defined as a mixture of oily and watery liquids<sup>5</sup>. Below image (starts from left to right) shows a stable emulsion occurs when small droplets oil dispersed throughout water solution. But it began to separate and broken where the separation of oil can be seen at the top of the solution<sup>7</sup>.



*Source: Cassidy, 2014*

### How to solve this?

Margarine and spreads are water-in-oil (W/O) emulsion which must be duly stabilised<sup>8</sup>. And because of that, an emulsifier can be added to create a stable emulsions<sup>1</sup>. The emulsifier coats the droplet so that it will not clump together, thus preventing the breakdown of emulsion<sup>1,7</sup>.

Emulsifier can also help margarine from separating of water droplets and spattering during cooking or frying process<sup>7</sup>. Emulsifiers consist of fat-soluble and a water-soluble part. The fat-loving part sticks to the oil, and the water-soluble part sticks to the water, creating an effective barrier around the droplets. These help to prevent the water and fat/oil from separating during the cooking process<sup>1,7</sup>.

Emulsifiers have different functionalities in margarines and spreads, leading to improved product quality. Below is the type of emulsifiers used:

|                                     |  |
|-------------------------------------|--|
| Mono- and diglycerides (DMG)        | Create a stable emulsion of water droplets equally dispersed in oil (fat)  |
| Polyglycerol polyricinoleate (PGPR) | Prevents the phase separation in the emulsion tank during preparation  |
| Polyglycerol esters (PGE)           | Used in margarine because of its ability to create air in the emulsion and stabilize it  |
| OilBinder                           | Oil-stabilizing or oil-absorbing, prevent oil separation of finished product during storage  |
| Citric acid esters (CITREM)         | Offers an allergen-free alternative to lecithin with good emulsification and anti-spattering behaviour, also can be used in all-purpose margarines |

*Source: Palsgaard, 2018*

## Conclusion

A number of emulsifiers existed nowadays have proved in helping two substances like oil and water, which cannot dissolve in each other to form a uniform, homogenous solution. Thus, can improved the final product quality.

At DPO, we are honoured to be in partnership with Palsgaard to bring you a range of ingredient choices that will elevate the quality of your fat and oil products.

## References

- <sup>1</sup>Cassiday, L. (2014). Emulsions: making oil and water mix. <https://www.aocs.org/stay-informed/inform-magazine/featured-articles/emulsions-making-oil-and-water-mix-april-2014?SSO=True>
- <sup>2</sup>Dunford, N. (2017). Margarines and Spreads. Oklahoma State University Extension. <https://extension.okstate.edu/fact-sheets/margarines-and-spreads.html>
- <sup>3</sup>Makanjuola, O. M. & Adepegba, A. O. (2020). Evaluation of Quality Attributes of Bread Produced from Bleached Palm Oil, Margarine and Lard. IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT), 14(12), 46-53. <https://doi.org/10.9790/2402-1412014653>
- <sup>4</sup>Mohd Rozalli, N. H., Chin, N. L., Yusof, Y. A., & Mahyudin, N. (2016). Quality changes of stabilizer-free natural peanut butter during storage. Journal of Food Science and Technology, 53(1), 694–702. <https://doi.org/10.1007/s13197-015-2006-x>
- <sup>5</sup>Master Class. (2021). What Is Emulsification and How Does It Work? Plus How to Fix Broken Emulsions. <https://www.masterclass.com/articles/what-is-emulsification-and-how-does-it-work-plus-how-to-fix-broken-emulsions#9-culinary-examples-that-illustrate-the-importance-of-emulsification>
- <sup>6</sup>Palsgaard. (2018). Emulsifiers for cake and cream margarine and household margarine. <https://www.palsgaard.com/en/products/oils-fats/household-margarine>

<sup>7</sup>Tereshchuk L. V., Starovoytova K. V., & Ivashina O. A. (2018). Practical aspects of the use of emulsifiers in manufacturing emulsion fat-and-oil products. *Foods and Raw Materials*, 6(1), 30-39. <https://doi.org/10.21603/2308-4057-2018-1-30-39>

<sup>8</sup>Zelman, K. (2017). Food Additives: Emulsifiers. *Food & Nutrition*. <https://foodandnutrition.org/november-december-2017/food-additives-emulsifiers/>