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How to Use ButterGel™ - by Nutrability

ButterGel is a flavorless, thermoreversible, helical shaped, hydrophilic molecule [1] with a hydrophobic core that forms a stable complex with lipids in a clathrate-like structure. The attraction between ButterGel and fat is hydrophobic / hydrophilic therefore shear is the determining factor in managing the intimacy of the introduction and the character of the resulting complex.

If a relatively low degree of shear is used the resulting complex may be rather coarse with some extremities of lipid globules partially controlled by ButterGel. The net mass of the complexes will be a composite of the denser ButterGel molecule and the lipid globule under its influence. Thus, if the partially clathrated lipid globule is relatively large, the resulting low specific gravity of the ButterGel/lipid complex will eventually cause the complex rise to the surface in a low viscosity fluid. There will probably be no free oil visible but the complex will behave as a low specific gravity material. As more shear is applied, the size of the uncontrolled portion of the lipid globule will decrease and the dissolved ButterGel molecule will exert more influence, eventually, with infinite shear, controlling the lipid on a molecule to molecule basis.

In any case, even with minimal shear [2], ButterGel is capable of assuming the entire role of fat management [3] without the assistance of other traditional emulsifiers.

There are several ways to formulate for the control of fat components:

1. Apply more shear, [4].
2. Manage the viscosity of the system to prevent specific gravity classification, [5].
3. Use a chilled/frozen food system to immobilize components, [6].

Some considerations when formulating with ButterGel:

In addition to its ability to manage lipids, ButterGel is a significant film former [7] and this accounts, in part, for the flavor delivery properties of ButterGel. Various degrees of engineering are available to manipulate the characteristics of the product. Longer chain versions form more robust films which hold flavor components longer during the chewing process [8] causing slower more prolonged flavor release and increased flavor memory effects. Shorter chain versions break down more quickly during chewing and release flavors quicker enabling a quicker “pop” of fruity or tart flavors. The ideal formulation may indeed use a combination of different ButterGel models to engineer the organoleptic echo and fine-tune the finished product.

ButterGel is also a fully thermoreversible material. Varying models have their own characteristic melting and re-solidification properties and these properties inure to the benefit of their finished products enabling a further dimension for managing texture and flavor profile, [9].

Notes

[1] Because ButterGel is a starch derived material with hydroxyl groups on the outer mantle it is essentially a water soluble molecule and is by definition somewhat hydrophobic. ButterGel should be dispersed in water, or the hydrated gel form should be used, and the oil phase should be introduced to the water phase with some shear. If ButterGel is introduced to the oil phase it will require more shear to activate the chemistry.

[2] Using, as a standard, a Braun hand-held stick mixer, take 500 grams of ButterGel gel (20% solids), float 500 grams soybean oil on top, immerse mixer to the bottom of beaker, turn on mixer and slowly draw the oil down into the ButterGel, mix until homogenous. The result is a “milk” which, when poured into an excess of water will form a thin milky solution.

[3] Using our formula for a one step cream cheese process, all of the butter oil (32% of total batch) is completely dispersed or emulsified by a 20% ButterGel component (ButterGel 20% solids) prior to the addition of any other functional/flavor components (which may then be chosen for flavor, nutritional and structural considerations without regard for emulsification).

[4] ButterGel is stable under high shear conditions and has been tested in excess of 10,000 psi with no apparent negative impact.

[5] The obvious hydrocolloid systems may be used in addition to various blends and concentrations of ButterGel to arrive at the desired viscosity. ButterGel is compatible and synergistic with a range of commercial viscosity modifiers.

[6] ButterGel has the very useful ability to pre-disperse mono and di-glycerides prior to their incorporation into ice cream mixes making them more effective.

[7] In fact, clathrates or complexes of ButterGel formed with lipids such as butter oil will dry to plastic like films with the lipid total encapsulated in the dried film. Plasticizers such as glycerol will yield flexible films and the addition of proteins such as gelatin will form tenacious, soft, flexible films that may encapsulate active guests.

[8] The active component in ButterGel is an amylose derivative and is degradable by the natural enzymes of the saliva and that mechanism forms the foundation of managing flavor release for ButterGel systems.

[9] This property is particularly useful in formulating ice creams and other frozen products where the rate of melt can combine with ButterGel’s other functions to further manipulate the overall organoleptic impact.