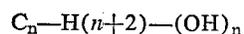


oils such as, for example, coconut oil, palm kernel oil, cottonseed oil, and soybean oil and heating the mixture under a blanket of inert gas in the presence of a transesterification or rearrangement catalyst such as, for example, sodium methoxide. Other glyceride oils of natural origin can also be catalytically rearranged to form hard butter type triglyceride fats having the properties hereinbefore described.

The amount of liquid employed in the compositions of this invention may vary from about 95% to about 99.99%, depending upon the contemplated end use of the compositions. Generally, compositions intended for food use will have a lipid content above about 98.5 to about 99.99 weight percent. For cosmetic or pharmaceutical uses, the lipid may be present in the compositions as low as about 95%.

The term "partial esters of polyols" as used herein is intended to mean and to refer to aliphatic compounds containing at least one hydroxyl group and at least one acyl group and are the reaction products of a polyol and an aliphatic carboxylic acid in which at least one of the hydroxyl groups of the polyol has been acylated and at least one of the hydroxyl groups of the polyol remains unreacted. Examples of such partial esters of polyols include monoglycerides, diglycerides, and mixtures thereof which are composed of partial esters of glycerine and saturated, unsaturated or mixed saturated and unsaturated fatty acids having from 4 to 26 carbons in the acyl group. Other examples are products containing a preponderance of partial esters of glycerol such as the reaction product of hydrogenated vegetable or animal fat with glycerine in the presence of an alcoholysis catalyst. Such products are separated by distillation and are described in U.S. Pats. 2,634,234, 2,634,278 and 2,634,279. Advantageous partial esters of glycerine are concentrated, pre-formed monoglycerides having at least about 85% of C₁₄-C₂₂ fatty acid monoglyceride or mixtures of such fatty acid monoglycerides including a commercially available monoglyceride with a total monoglyceride content of 90% minimum. Such monoglyceride has an iodine value of below 2, a guaranteed minimum total monoglyceride content of 90%, a Lovibond color of about 2 red and 10 yellow, a free fatty acid concentration of about 0.6% and a capillary melting point of 154-156° F. These monoglycerides are usually partial esters of stearic and palmitic acids wherein the ratio of stearic to palmitic acid is about 74:26. Other partial esters which can be employed include diglycerides including vicinal and non-vicinal diglycerides such as, for example, 1,2- and 1,3-diglycerides and mixtures thereof. Typical 1,3-diglycerides (sometimes referred to as symmetrical diglycerides) are 1-stearoyl-3-palmitoyl diglycerides, 1,3-di-olein; 1-stearoyl-3-olein; 1-palmitoyl-3-olein and the corresponding 1,2-diglycerides sometimes referred to as asymmetrical diglycerides.

Other suitable partial esters of polyols include monoesters of ethylene and propylene glycols in which the esters are those of aliphatic carboxylic acids containing from 4 to 22 carbon atoms in the acyl group. Still other partial esters are acyl esters of polyatomic alcohols having the empirical formula:



wherein n is an integer of 4 or greater and where the term "polyatomic alcohol" refers to linear aliphatic polyhydric alcohols containing 4 or more carbon atoms wherein a hydroxyl group is attached to each carbon atom in the linear carbon atom chain of the alcohol. Examples of polyatomic alcohols whose partial esters can be employed are the tetritols (e.g., erythritol) which comprises the isomers of linear aliphatic polyatomic alcohols containing prior to partial esterification 4 carbon atoms and 4 hydroxyl groups; the pentitols (e.g., arabitol) which are isomers of polyatomic alcohols containing 5 carbon atoms and prior to partial esterification 5 hydroxyl

groups; the hexitols (e.g., mannitol and sorbitol) which are isomers of polyatomic alcohols containing 6 carbon atoms and prior to partial esterification 6 hydroxyl groups; the heptitols (e.g., perseite) which are polyatomic alcohols containing 7 carbon atoms and prior to partial esterification 7 hydroxyl groups and the like. Other partial esters of polyols include partial esters of 1,3-butylene glycol, partial esters of sugars such as glucose, dextrose, levulose, fructose and sucrose, polyoxyethylene sorbitan partial esters, sorbitan partial esters, and partial esters of polyglycerols.

All of the foregoing partial esters are prepared by reacting the polyol with an aliphatic saturated or unsaturated carboxylic acid, preferably a monocarboxylic acid containing from 4 to 26 carbon atoms in the aliphatic chain wherein the amount of carboxylic acid is below that sufficient to fully esterify the polyol. Other partial esters of polyols include partial esters of polyglycerols (e.g., polyglycerols containing between 2 to about 10 glyceryl units in the polyglycerol chain in which the acyl groups in the polyglycerol comprise from about 0.5 to about 2.5 acyl groups per glyceryl unit in the partial polyglycerol ester. The amount of partial ester of polyol which can be employed in the compositions of this invention will depend to an important extent upon the amount of TiO₂ which it is desired to use because, as will be hereinafter evident, the partial ester tends to act as a suspending agent for the TiO₂ particles.

The partial ester of polyol is advantageously employed in a partial polyol ester:TiO₂ weight ratio of between about 1:100 and about 10:1. Although ratios greater than 10:1 can be employed, there is usually no advantage and when ratios greater than 10:1 are employed, the compositions may sometimes be uneconomical. If ratios of less than 1:100 are employed, there is danger that the TiO₂ will not remain in suspension when the composition is employed to form aqueous emulsions. Generally speaking, partial polyol ester:TiO₂ ratios of between 1:10 and 10:1 are especially suitable in the compositions of this invention for most end use applications.

The finely divided food grade TiO₂ which can be employed in the compositions of this invention can be either rutile, anatase, or mixtures of these crystalline forms of TiO₂. The particular crystalline type will usually depend upon the intended end use of the composition because rutile TiO₂ tends to impart a pale bluish-white tinge or tint to compositions containing it whereas anatase TiO₂ tends to impart a pale redish or yellowish-white tinge or tint to the compositions. From the standpoint of particle size, food grade pigmentary TiO₂ is preferred because particles having the particle size of pigmentary TiO₂ particles are more efficient in reflecting light than are the non-pigmentary (e.g., smaller) TiO₂ particles. Since rutile TiO₂ has a density of about 4 grams per cm.³ and anatase TiO₂ has a density of 3 grams per cm.³, it was surprising to find that these materials, which have a significantly greater density than water and lipids, would form aqueous emulsions in which the TiO₂ particles do not separate but remain in the lipid phase and that the presence of TiO₂ tends to stabilize aqueous emulsions. In other words, the TiO₂ tends to prevent the aqueous emulsion from separating into lipid-water fractions. The compositions are prepared by intimately mixing the lipid, partial ester of polyol and the TiO₂ by any number of conventional methods such as by manual or mechanical grinding, milling, mulling, tumbling, agitation, and the like, and is usually accomplished by mechanical means. In order to insure intimate mixing, it is usually desirable that the lipid and partial ester be liquid. If either component is a solid or semi-solid, it should be liquified by heating or dissolving in a solvent. In many instances, the components are suitably mixed by blending them in a mechanical blender or a homogenizer while in the liquid state.

Although the components can be mixed simultaneously or in any order, it has been found preferable to prepare