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Fabrication of coffee whiteners using Quillaja saponin and soy lecithin as natural emulsifiersCheryl Chung¹, Alexander Sher², Philippe Rousset², Eric Andrew Decker¹ and David Julian McClements¹¹University of Massachusetts, USA²Nestlé Development Center Marysville, USA

Statement of the Problem: Rising consumer demand for food products made with natural and plant-based ingredients has led to a search for natural alternatives to synthetic food ingredients. However, more studies are needed to determine their suitability as emulsifiers in specific food products, for example, coffee creamers. The present study compared the ability of two natural small molecule surfactants—Quillaja saponin (0.5–2.5%) and soy lecithin (1–5%) – to stabilize 10% oil-in-water emulsions for use as model coffee creamers.

Methodology & Theoretical Orientation: The physical properties of the emulsions and their stability against feathering and creaming after added to acidic hot coffee were determined.

Findings: The emulsions lightness decreased with increasing emulsifier concentration in both systems, which was attributed to the inherent color of the emulsifiers (increased absorption) and the decrease in droplet size (decreased scattering). The mean droplet diameter decreased with increasing emulsifier concentration (0.5 to 0.15 micron for Quillaja saponin and 0.8 to 0.14 micron for soy lecithin) due to their ability to cover more surface area. Both emulsifiers led to the formation of oil droplets with a high negative charge (zeta potential of –45 to –70 mV), thereby generating a strong electrostatic repulsion that helped protect them against aggregation. Emulsions with higher emulsifier content remained physically stable when added to an acidic hot coffee solution (85°C), with no visible phase separation or increase in particle size.

Conclusion & Significance: This study provides insight to the potential of two natural emulsifiers to form stable emulsions suitable for application in coffee creamers.

Biography

Cheryl Chung has experience in design, formulation and fabrication of low fat emulsion systems for development of healthful food products. She uses structural design approach to fabricate low fat sauces and salad dressings that possess similar physicochemical and sensory attributes as their full-fat counterparts. The use of structured emulsions (hydrogel particles, double emulsions, or multi-layer emulsions) can provide controlled-release mechanism to regulate the release of the encapsulated ingredients (e.g., fats). She is also interested in studying the potential use of natural and plant-based ingredients for stabilizing emulsion systems that are often stabilized by synthetic emulsifiers. Overall, regular consumption of healthful food products that are low in calories and contained natural, functional food (e.g., probiotics, flavonoids) and bioactive (e.g., polyunsaturated fatty acids) ingredients have potential to improve one's health and wellness

cychung@foodsci.umass.edu

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