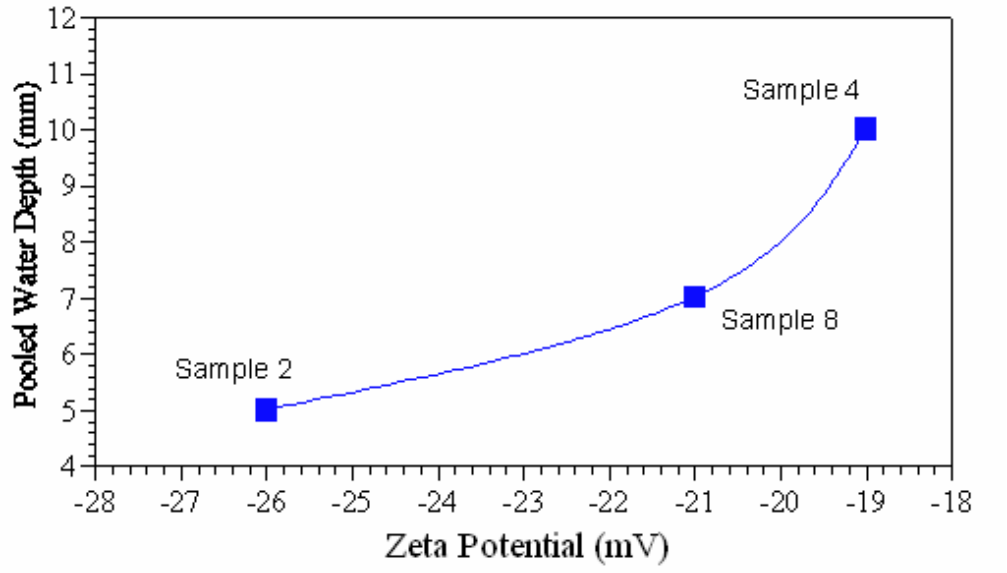
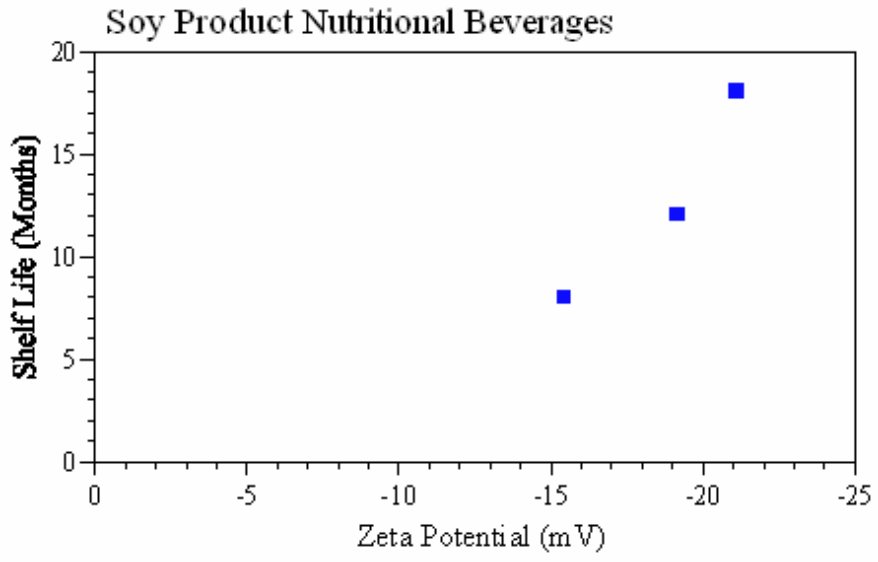
Food Products

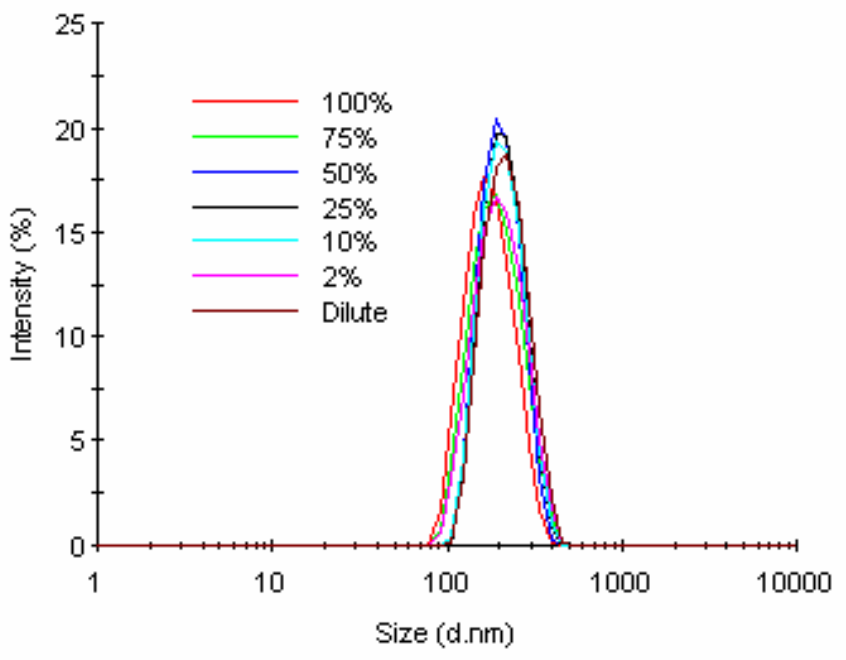
Particle size and surface charge are of great relevance to researchers within the food industry, due to their influence on product shelf life, aesthetic appeal, and palatability. In food product areas such as edible films, the wine & beer industries, oil in water emulsions, milk products, and food flavorings, monitoring and fine tuning of the colloidal properties of the product, e.g. size and zeta potential, has become routine practice as a means of enhancing customer satisfaction. Consider for example, the figure below, which shows the correlation between the zeta potential and the standing water depth for 3 ketchup samples. Marketers have invested years of man-hours attempting to disguise the "water layer" at the top of a ketchup bottle, with solutions ranging from "shake well before using" labels, no drip caps, opaque colored plastic bottles, and product labels uniquely positioned to hide the phase separation. As evident in the figure below, control of the colloidal properties may very well eliminate the need for disguising gimmicks.



The correlation between shelf life and zeta potential has been recognized and understood for many years. As the magnitude of the zeta potential increases, so does the electrostatic repulsion between neighboring particles. At the high concentrations inherent to food formulations, electrostatic stability is essential to ensuring that when the consumer views the product on the grocery shelf, they see the homogeneous dispersion prepared in the processing facility, rather than a somewhat unappealing two phase mixture. The figure below shows an example of the correlation between shelf life and zeta potential for three nutritional beverages derived from soy products.



An additional complexity within the food industry, is the need for the product to maintain “consumer friendly” characteristics beyond the purchase, e.g. during consumer preparation and use. As a hypothetical example, let us consider tooth paste. How conducive to future sales would a tooth paste product be, if the formulation was such that it broke down instantly and lost its grittiness upon contact with water. As a real example, consider the figure below, which shows the particle size distribution for an alcoholic beverage emulsion as a function of dilution. As the beverage is poured in a restaurant, it is diluted with spirits, water, and other diluents. Palatability and aesthetic appeal would both be significantly reduced, if the emulsion was unstable to dilution. As noted in the figure below, the formulation for this product is optimized to maintain the same particle size, even under very dilute conditions.



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