



Contactorm™ Reactor Applications

SOAPS

STRATCO®, in conjunction with a leading international soap and cosmetic manufacturer, developed a continuous saponification process for their premium quality beauty bar. Previously the commercial production facilities of this Fortune 500 Company utilized a batch process. This was quite labor intensive and product inconsistency between batches required substantial reworking. A continuous process that yields a consistent, high quality, on-specification product reduced their costs and improved their manufacturing efficiency.

We successfully demonstrated that their product can be consistently produced on a continuous basis using the STRATCO® Contactor as the saponification reactor. Production rates exceeded expectations and finished product quality met their stringent specifications. This manufacturer is currently constructing a completely continuous pilot plant facility to produce their product. In addition to continuous manufacturing of the luxury soap product, their pilot plant includes a continuous bar forming and packaging equipment.

LOTIONS

While most creams and lotions are thickened by gums and polymers, they still require good emulsification for stability. Lotions usually fall into the oil-in-water emulsion category. The following table shows a simple moisturizing lotion formula we processed in our pilot plant as part of a feasibility test for a major cosmetic company.

Moisturizing lotion:

Water phase	Concentration
Water, %	40
Polyol, %	4
Emulsifier, %	7
Oil phase	
Beeswax	5
Mineral oil	26
Hydrogenated vegetable oil	28

In the pilot plant the water phase and the oil phase ingredients were heated to the proper mixing temperature and then continuously metered into a 300 cc Contactor. To determine the capacity of the Contactor in this application, residence times were continually reduced until the product quality was less than required by the client's specifications. We found that the Contactor residence time can be reduced to approximately 5 seconds before poor quality product is produced. At this residence time, the 300 cc Contactor can produce over 400 lb/hr of moisturizing lotion. Average oil droplet diameter is less than 5 microns. The lotion produced is stable and was judged by the client to be higher quality than their current commercial production.

FOOD

Many food products are emulsions or have an emulsion formed during their process. Salad dressing, cake batter and non-dairy creamer are a few examples. Most food emulsions are the easier to produce oil-in-water type. That is, the fats, oils and other lipophilic ingredients are finely dispersed into a continuous



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phase of hydrophilic (water-loving) ingredients. Other foods are water-in-oil emulsions, where the water phase is dispersed within the continuous oil phase. Mayonnaise is an example of a water-in-oil emulsion.

No chemical reaction is necessary to produce most emulsions. However, good emulsification is important for product consistency and stability. Usually, the dispersed phase particle size should be about 3-5 microns and a surfactant is required to help prevent coalescing. In mayonnaise, the egg yolks act as the surfactant. The following table shows a typical mayonnaise formula divided into oil and aqueous components.

Typical mayonnaise formula:

Brine	
Water, %	
120 Grain vinegar, %	6.83
Corn syrup, %	2.55
Mustard flour, %	2.33
Salt, %	0.70
Lemon juice powder, %	0.53
Calcium disodium EDTA, %	0.05
Salted Egg Yolks, %	0.01
Soybean oil, %	7
	80

Ingredients are continuously metered into a 300 cc Contactor and finished product is continuously withdrawn. In the pilot plant, all aqueous ingredients (egg yolk and brine) are pre-blended before being pumped into the Contactor.

Results of our mayonnaise production experiments were excellent. Premium quality mayonnaise was produced at a rate of approximately 2 liters/min. Viscosity was comparable to commercially available mayonnaise and organoleptic properties were excellent. As a result of these tests, we are working with a regional manufacturer of mayonnaise and other food products to utilize the Contactor in their manufacturing facility.

OTHER APPLICATIONS

Other new applications being evaluated for this vintage machine include:

- Chemically treating non-hazardous and hazardous wastes.
- Blending of chemical wastes for future incineration or other disposal.
- Chemical synthesis of lubricating oil additives.
- Production of pharmaceutical creams and specialty drugs.

SUMMARY

In summary, the STRATCO® Contactor is a very versatile and efficient machine. Any process that requires emulsification or mixing of dissimilar liquids or reactants, that may or may not need precise temperature control during processing, can be efficiently and effectively accomplished in the STRATCO® Contactor. Some of the advantages of the Contactor over other types of equipment are:

- Efficient emulsification of dissimilar liquids.
- Rapid dispersion of a small amount of one ingredient into a large mass of a second ingredient.



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- Efficient temperature control of the material it contains and/or the ability to take this material through any desired temperature cycle.
- Pressure or vacuum operation.
- Flexibility for either batch or continuous processes and/or several processes in one manufacturing plant.
- Multiple sizes and metallurgy.

In short, it is apparent this vintage machine is not getting older, it's getting better!