

Venturi tube method as a continuous process to obtain emulsions by saponification

NT_452

García-Salazar, Gilberto^a; Serrano-Mora, Eduardo^a; Zambrano-Zaragoza, María de la Luz^b; Mendoza-Díaz, Sandra O^c.; Quintanar-Guerrero, David^{a*} ^aLaboratorio de Investigación y Posgrado en Tecnología Farmacéutica, UNAM, FESC, ^bLaboratorio de Procesos de Transformación y Tecnologías Emergentes de Alimentos, UNAM, FESC, ^cDepartamento de Investigación y Posgrado en Alimentos, UAQ, FQ

Introduction:

Emulsions are a mix of both liquids, organic phase, and aqueous phase. Mechanical agitation can be achieved by shakes mixers/agitators, propeller mixers, turbine mixer, homogenizers, colloid mills. This kind of production on a large-scale requires mixing for long periods that produce high costs of energy and time. A different way to produce a mixing process is through a static device as a Venturi tube. This device can mix two or more fluids without additional equipment. Also, the Venturi tube does not have moving parts, so maintenance cost could be low. Therefore, the Venturi tube is an option to produce cosmetic emulsions by saponification with a low cost and low energetic consumption.

Materials & Methods:

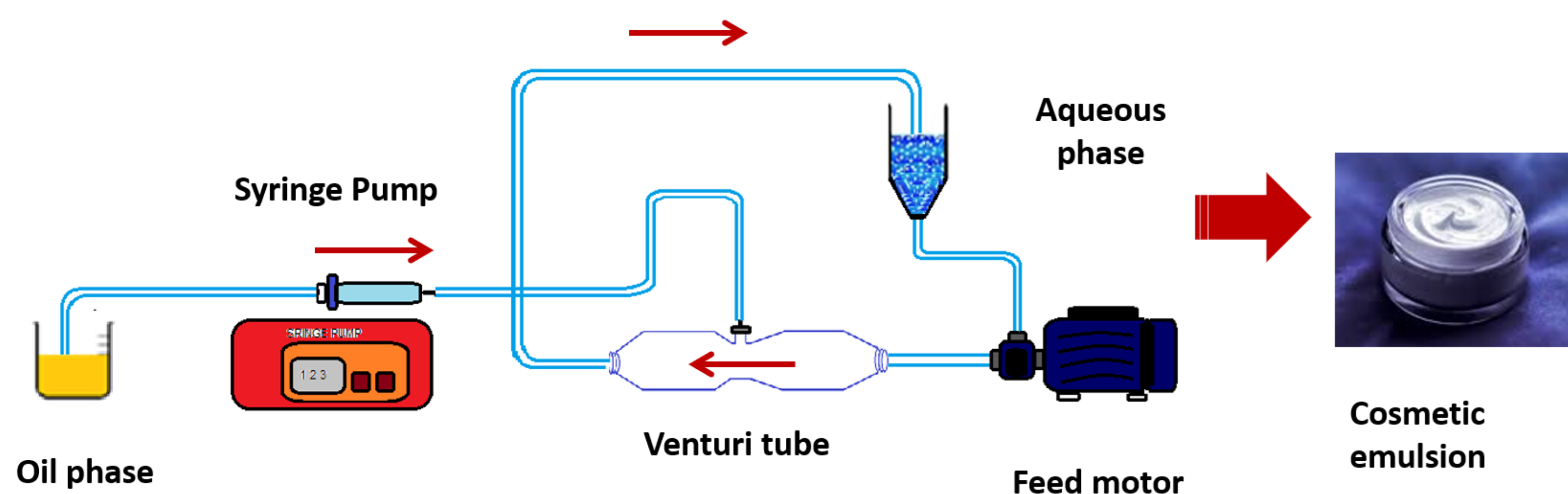


Figure 1. Preparation of emulsions by Venturi tube method

Oil phase		Aqueous phase	
Component	Proportion % (w/w)	Component	Proportion % (w/w)
Stearic acid	2.5	Triethanolamine	0.7
Mineral oil	10.0	Glycerine	0.6
Cetyl alcohol	0.7	Methyl paraben	0.1
Lanoline	0.6	Water	84.5
Propylparaben	0.1		
Ethyl acetate	5.0		

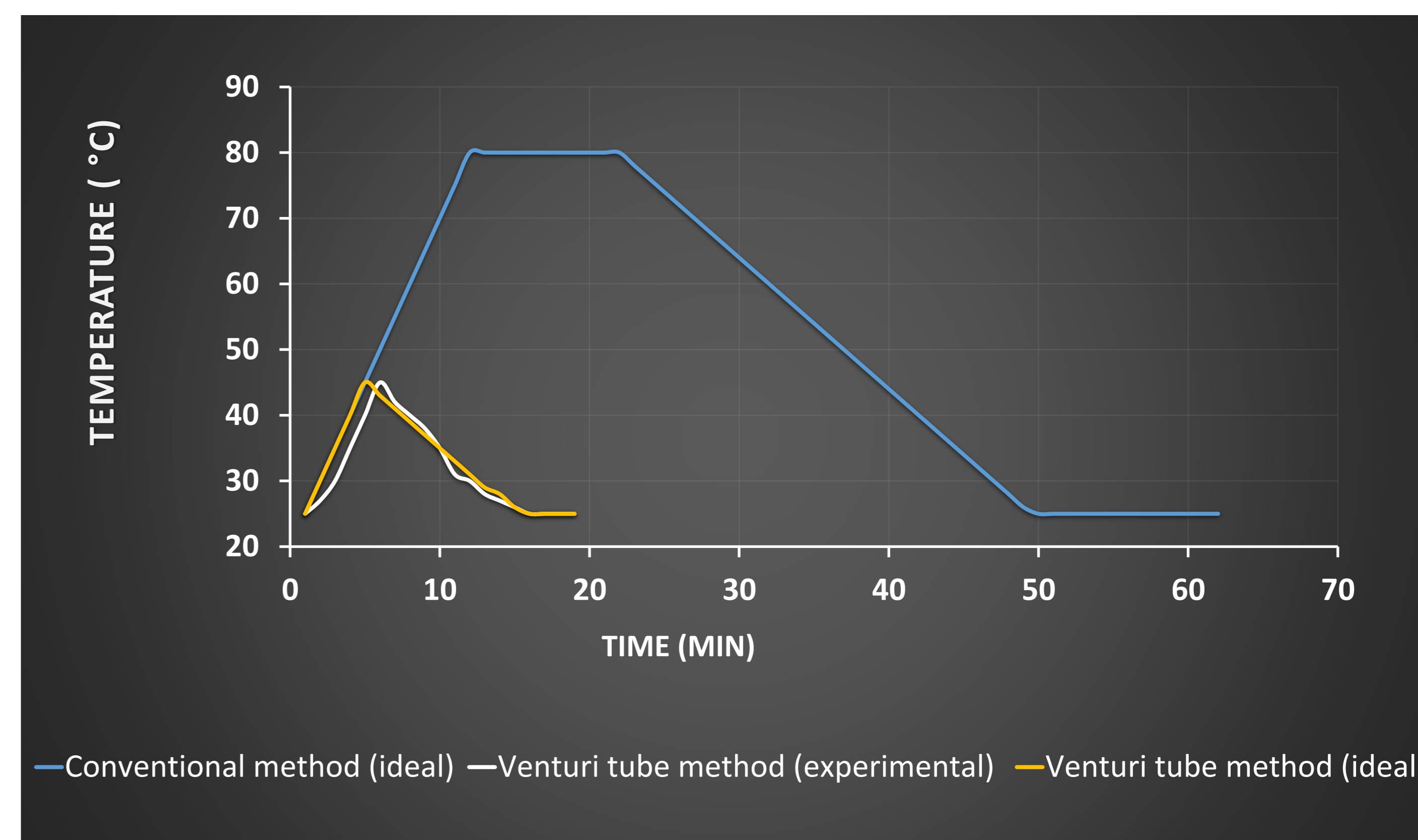
Table 1. Formulation composition of emulsions by Venturi tube method

Results & Discussion:

Table 2. Characterization of emulsions prepared by Venturi tube method

Organoleptic properties	Colour	White
	Odor	Characteristic
	Appearance	Pearly
	Texture	Evanescent
Physicochemical properties	Viscosity(cps)	866 ± 132
	Stability test	There is not precipitate
	Size globule (µm)	2.2 ± 0.56
	pH	8.2 ± 0.15

Figure 2. Preparation time of conventional and Venturi tube method.



Conclusions:

A cosmetic cream was obtained with textural and appearance properties similar to commercial cream by Venturi Tube method, which is a new way to produce a cosmetic emulsion that can save energy and time because it is unnecessary to heat both phases upper to 80 °C. The last generates a low energetic consumption with less time preparation. Therefore, Venturi tube method could be a versatile platform that offers the opportunity to achieve industrial scale-up as a continuous method for obtaining cosmetic, pharmaceutical, and food emulsions.

References:

- G. García-Salazar, et al , "Preparation of nanodispersions by solvent displacement using the Venturi tube," *Int. J. Pharm.*, vol. 545, no. 1–2, pp. 254–260, 2018.
- K. C. Powell and A. Chauhan, "Interfacial effects and emulsion stabilization by in situ surfactant generation through the saponification of esters," *Colloids Surfaces A Physicochem. Eng. Asp.*, vol. 504, pp. 458–470, 2016.
- S. Sundararaj and V. Selladurai, "An Analysis on the Proportional Mixing of Liquids using Venturi Jet Mixer," *Int. J. Appl. Eng. Res.*, vol. 3, no. 7, pp. 891–902, 2008.