**STABILITY OF MICROEMULSIONS WATER IN OIL (W / O) TO CHANGES OF PH CHARGED WITH CANTOCYANINS OF *Ardisia compressa* K.**

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**Highlights**

* It shows three formulations containing dispersed phase mass fractions of 10, 20 and 30% respectively.
* Summarizes the stability presented by the microemulsions at pH changes
* Provides detailedde accelerated stability profiles

**1. Introduction**

The fruit of ACK presents a high content of total phenolic compounds, mainly anthocyanins; These compounds have functional properties as antioxidant activity and with potential for their use as natural dyes. However, due to their high reactivity they are highly susceptible to degradation against environmental factors such as light, temperature, pH, among others. In this way, the incorporation of these compounds in encapsulation systems allows not only provide a means of transport, but also protection and release. EM´s are translucent, optically isotropic and thermodynamically stable dispersions, which have a small droplet size (5-50 nm) and low surface tension, which can result in better permeation and high absorption of compounds. Scientifically, ME is a dispersion of oil, surfactant and water [1] and are found in such concentrations that they form spontaneously, and whose formation depends on the thermodynamic equilibrium between the aqueous, oily phases, and the surfactant. The ME can be a good liquid membrane carrier for the transport of hydrophilic substances through the lipoidal media and for transporting the hydrophobic substances through the aqueous medium [2]. In this sense, the pH of the aqueous phase has a significant effect both on the type of the emulsion and on its stability and functionality. So the objective of this research is to evaluate the kinetic stability of MEW/O when subjected to pH changes by determining the change in Dhd and its stability against sedimentation phenomena.

**2. Methods**

Ethanolic extracts of ACK (5 g of ACK in 50 mL of EtOH 75% v / v) were obtained. MEW/O were obtained by means of a low energy method, where the ethanolic extract of ACK [10-30%] was dripped in the oil phase constituted by rosemary essential oil (due to its functional properties; AER) [40-80%], and Tween 80 (T80) and Span 80 (S80) [50:50, 10-30%] as surfactants. The obtained emulsions were adjusted in their initial pH (5.0) and characterized according to their Dhd in a dynamic light scattering size analyzer (NanoSizer ZS) and accelerated stability in a Lumisizer dispersion analyzer, operated at 2000 rpm with 250 measurements every 30 s [3]. From these data the sedimentation velocities were obtained for each emulsion.

**3. Results and discussion**

The fresh MEW/O presented an initial pH of 5, with purple colorations. The Dhd ranged from 1.82 to 3.36 nm, where at a higher concentration of aqueous phase and surfactant showed a significant reduction in droplet size (P <0.05). When carrying out the pH modification it was observed that in acidic conditions the Dhd presented changes in all emulsions, observing significant difference for 10 and 20% concentrations of extract and surfactant. For the pH of 7 there was a significant increase in Dhd, of ME2, followed by ME1 (Figure 1). It is worth mentioning that ME3 was the system with the lowest pH effect. This may be due to the fact that the presence of the different counterions (OH -, H +) present in the medium, can induce the destabilization of the equilibrium reached during the formation of the ME and that, under a certain level of concentration of both extract and of surfactant, this effect is minimized. Table 1 shows the values ​​obtained for the sedimentation rate as an accelerated stability evaluation method derived from the transmission profiles of the ME, for the ME3 it was stable, while for the ME2 it increased in the two pHs (3 and 7).

 **Tabla 1**. Sedimentation rate of the MEO/W

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| --- | --- |
|  | Sedimentation rate (s-1) |
|  | pH 3 | pH 5 | pH 7 |
| ME1 | -0.1536 ±0.09 | 0.1156±0.04 | -0.0731±0.06 |
| ME2 | 0.3212±0.10 | 0.1707±0.02 | 0.3142±0.08 |
| ME3 | 0.1148±0.01 | 0.1651±0.02 | 0.1497±0.09 |

**Tabla 1**. Tasa de sedimentación de las MEO/W

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**Figure 1.** Effect of pH on the Dhd of the MEO/W.

**4. Conclusions**

The ME containing 30% ACK extract and 30% surfactant showed the best physical and kinetic stability with respect to pH change, while ME2 showed the highest change in its Dhd and higher sedimentation rates followed by ME1. The above can be attributed to the fact that the stability of these dispersed systems depends on the equilibrium achieved between the different phases involved, so that the modification of the ionic strength in the medium promotes the generation of new equilibriums that impact stability and potentially functionality of these systems. The above opens the guideline to the evaluation of the chemical stability of the materials trapped in the ME´s.

**References**

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