



## INSTRUCTIONS

# NANOSTABILIZER®-LSO

USER GUIDE:

WITH LSP-600 PROCESSOR IN THE FLOW-THROUGH CONFIGURATION



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## MATERIALS NEEDED:

- LSP-600 ultrasonic processor configured in the flow-through mode (see LSP-600 User Manual and Peripheral Equipment Guide for details);
- Digital scale, peristaltic pump, water chiller, 1.2 micron in-line capsule filter;
- 1 - 2 L beaker with a bottom outlet (process vessel), magnetic stirrer with hotplate and stir-bar, dark-glass storage container (finished product container);
- NanoStabilizer®-LSO, cannabis extract\* (e.g., isolate, distillate, full-spectrum oil, etc.), distilled water.

## INSTRUCTIONS FOR MAKING 1,000 ml OF NANOEMULSION:

The instructions below detail the method for preparing 1,000 ml of nanoemulsion with the cannabis extract concentration of **20 mg/ml**. If a different concentration is desired\*\*, use the table below and substitute the bolded numbers in the instructions with the numbers in the colored boxes.

Cannabis extract concentration in nanoemulsion**	10 mg/ml	20 mg/ml	30 mg/ml	40 mg/ml	50 mg/ml
Cannabis extract	10 g	20 g	30 g	40 g	50 g
NanoStabilizer®-LSO	40 g	80 g	120 g	160 g	200 g
Distilled water	950 g	900 g	850 g	800 g	750 g
Total	1,000 g	1,000 g	1,000 g	1,000 g	1,000 g
Number of 10 mg doses per 1,000 ml of nanoemulsion	1,000	2,000	3,000	4,000	5,000

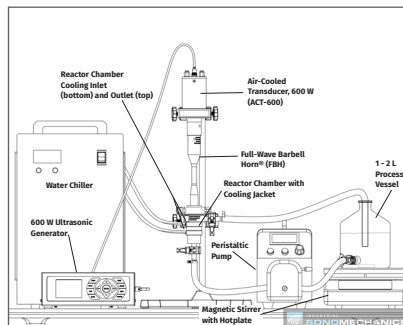
\* If your cannabis extract is solid or very viscous at room temperature (e.g., CBD isolate, Delta 8 THC), it may be necessary to dissolve it in a small amount of carrier oil (e.g., 1 part of MCT oil or terpene to 3 - 4 parts of extract by weight) before processing. Heating to approximately 50 °C (122 °F) may be required to fully dissolve the extract in the carrier oil.

\*\* If your intention is to ultimately convert this nanoemulsion into a water-soluble powder, we recommend that you stay with the **20 mg/ml** concentration, as detailed in this guide.

## 1

## Setting up the liquid recirculation network and adding distilled water:

- a. Assemble the LSP-600 ultrasonic processor in the flow-through mode (see LSP-600 User Manual, LSP-600 Peripheral Equipment Assembly Guide and schematic on the right for details).
- b. Place the stir-bar into the process vessel.
- c. Dispense **900 g** of distilled water into the process vessel. Start stirring at a low speed.
- d. Check that all connections in the liquid recirculation network are properly clamped. The distilled water should be set up to flow from the bottom of the process vessel to the reactor chamber and back to the top of the process vessel (see LSP-600 User Manual and LSP-600 Peripheral Assembly Equipment Guide for details). To avoid foaming, make sure that the hose returning the liquid to the process vessel is submerged into the liquid by about 5 cm.
- e. Open the bottom outlet valve of the process vessel (if applicable). Turn the peristaltic pump ON, then immediately OFF and check for any leaks in the process recirculation network. For assurance, perform this step several times. If no leaks are observed, proceed to the next step. Keep the pump off for now.
- f. Turn on the hotplate and bring the water to approximately 50 °C (122 °F). Do not supply cooling water to the reactor chamber's cooling jacket yet.



## 2

## Adding NanoStabilizer®-LSO and cannabis extract to the process vessel:

- a. Place the NanoStabilizer®-LSO container on the digital scale and tear. Begin dispensing NanoStabilizer®-LSO into the process vessel, periodically placing the container back on the digital scale.
- b. Take note of the mass each time the NanoStabilizer®-LSO container is placed back reading on the scale each time the container is placed back on the digital scale - the negative of that number indicates how much NanoStabilizer®-LSO has been moved from the container. To ensure accurate measurement, as you get closer to your target value (-80 g in this case), dispense decreasingly smaller

amounts. Continue this until **80 g** have been removed from the NanoStabilizer®-LSO container (the digital scale reads: “**-80 g**”).

- c. Allow the contents of the process vessel to stir to disperse NanoStabilizer®-LSO until none remains floating on top of the water and the temperature reaches about 50 °C (122 °F).
- d. While NanoStabilizer®-LSO is being dispersed in the distilled water, warm up your cannabis extract to about 50 °C (122 °F).
- e. Follow a procedure similar to 2b above to accurately dispense **20 g** of your warmed cannabis extract into the process vessel. Remember that your cannabis extract container will be warm. Please handle with caution.
- f. Continue to stir (increasing the speed as needed) until the ingredients appear thoroughly mixed.
- g. Turn the peristaltic pump on to begin recirculating the processed liquid at the rate of 0.5 - 1.5 L/min.

### 3 High-intensity ultrasonic processing:

- a. Connect the reactor chamber's cooling jacket to the water chiller (see LSP-600 User Manual for details). Start supplying cooling water and maintain the processed liquid temperature between 50 - 65 °C (122 - 149 °F) throughout the rest of the process. Adjust the water chiller temperature if the processed liquid becomes too cold.
- b. Throughout the process, verify that the transducer is not overheating (see LSP-600 User Manual for details).
- c. On the LSP-600 generator, set the ultrasonic amplitude to 80 % (see LSP-600 User Manual for details) and activate ultrasound. Note that this amplitude setting can be adjusted up or down to optimize the results.
- d. **For users with access to particle size analysis (preferred).** After processing for 50 min, draw a sample every 10 minutes and run the droplet size analysis. Once two consecutive samples demonstrate no significant decrease in the median droplet size, deactivate ultrasound.

**For users without access to particle size analysis.** Continue the process for about 1 hour. Deactivate ultrasound.

- e. Allow your nanoemulsion to stir, recirculate and cool down to 35 °C (95 °F).
- f. Once cooled, collect all of the nanoemulsion from the tubing and reactor chamber into the process vessel (see LSP-600 Peripheral Equipment Assembly Guide for details) and proceed to the next step.

# 4

## Filtration:

In this step, you will use the in-line capsule filter to remove any particulate contamination from your nanoemulsion as you collect it in the finished product container.

## PARTS NEEDED:



1. 1.2 micron In-line capsule filter with 1/2" sanitary fitting
2. Peristaltic pump with 1/2" ID silicone hose
3. 1/2" sanitary to 1/2" hose ID adapter
4. Sanitary clamp
5. Sanitary gasket

- a. Detach the bottom sanitary flanged connection from the reactor chamber and connect it to the inlet of the 1.2 micron in-line capsule filter. Assemble items 1 - 5 as shown.



- b.** Using your pump at the flow rate setting of 100 ml/min, filter the nanoemulsion by passing it through the 1.2 micron in-line capsule filter into the pre-sterilized finished product container.



- c.** Store the finished product container with the filtered nanoemulsion in a cool and dark place.
- d.** Flush the filter with distilled water gently in both directions until the water runs clean.





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