



INSTRUCTIONS

NANOSTABILIZER®-LSO

USER GUIDE:

WITH ISP-3600 PROCESSOR IN THE FLOW-THROUGH CONFIGURATION



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MATERIALS NEEDED:

- ISP-3600 ultrasonic processor configured in the flow-through mode (see ISP-3600 User Manual and ISP-3600 Peripheral Equipment Assembly Guide for details);
- Digital scale, peristaltic pump, 1.2 micron in-line capsule filter;
- 50 L storage tank with mixer and valved bottom outlet, dark-glass storage container (finished product container);
- NanoStabilizer®-LSO, cannabis extract* (e.g., isolate, distillate, full-spectrum oil, etc.), distilled water.

INSTRUCTIONS FOR MAKING 20,000 ml (20 L) OF NANOEMULSION:

The instructions below detail the method for preparing 20,000 ml (20 L) 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	200 g	400 g	600 g	800 g	1 kg
NanoStabilizer®-LSO	800 g	1.6 kg	2.4 kg	3.2 kg	4 kg
Distilled water	19 kg	18 kg	17 kg	16 kg	15 kg
Total	20 kg	20 kg	20 kg	20 kg	20 kg
Number of 10 mg doses per 20,000 ml of nanoemulsion	20,000	40,000	60,000	80,000	100,000

* 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 a terpene to 3 – 4 parts of extract by weight) before processing. Heating to approximately 70 °C (158 °F) may be required to fully dissolve the extract in the carrier oil.

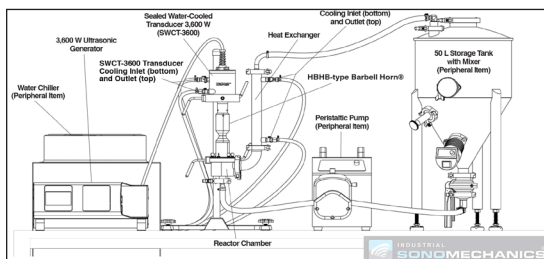
Note: We do not recommend processing extracts with high wax contents as some of the wax may remain untreated, separate from the nanoemulsion and interfere with filtration.

** If your intention is to convert this nanoemulsion into a water-soluble powder, we recommend that you stay with the 20 mg/ml concentration, as detailed in this guide. We also recommend that you dry/powderize the nanoemulsion withing 48 hours of producing it.

1

Setting up the liquid recirculation network and adding distilled water:

- a. Assemble the ISP-3600 ultrasonic processor in the flow-through mode (see ISP-3600 User Manual, ISP-3600 Peripheral Equipment Assembly Guide, and schematic on the right for details).



- b. Make sure the bottom outlet valve of the storage tank with mixer is closed. Dispense **18 L** of distilled water into the storage tank with mixer. Start running the mixer at a high speed (80 – 100 %).

2

Adding NanoStabilizer®-LSO and cannabis extract:

- a. Place the NanoStabilizer®-LSO container on the digital scale and tear. Begin dispensing NanoStabilizer®-LSO in small portions into the storage tank with mixer, periodically placing its container back on the digital scale.
- b. Take note of the mass each time the NanoStabilizer®-LSO container is placed back on the digital scale – the negative of that number indicates how much NanoStabilizer®-LSO has been removed from the container. To ensure accurate measurement, as you get closer to your target value (**-1.6 kg** in this case), dispense decreasingly smaller amounts. Continue this until **1.6 kg** have been removed from the NanoStabilizer®-LSO container (the digital scale reads: **"-1.6 kg**").
- c. Allow the contents of the storage tank with mixer to stir and disperse NanoStabilizer®-LSO until none remains floating on top.
- d. While NanoStabilizer®-LSO is being dispersed in the distilled water, begin warming your cannabis extract until it reaches about 60 °C (140 °F) and fully melts.
- e. Follow a procedure similar to 2a – 2b above to slowly dispense **400 g** of your melted cannabis extract into the storage tank with mixer.
- f. Once **400 g** of your cannabis extract has been dispensed into the storage tank with mixer, allow it to mix into the liquid until none remains floating on top.

3

Ultrasonic Processing:

In this step, ultrasonic processing will commence. Refer to ISP-3600 User Manual for operating instructions.

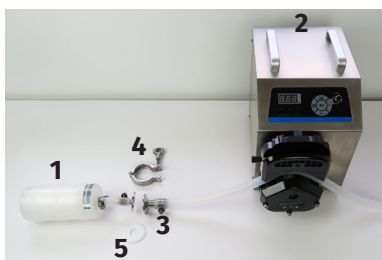
- a. Check that all connections in the process recirculation network are properly clamped. The liquid should be set up to flow from the bottom of the storage tank with mixer to the reactor chamber and back to the top of the storage tank with mixer (see ISP-3600 User Manual and ISP-3600 Peripheral Equipment Assembly Guide for details).
- b. Open the valve on the bottom of the storage tank with mixer. Turn the 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.
- c. Turn the pump ON and begin recirculating the liquid at the flow rate of 2 – 10 L/min.
- d. Turn on the water chiller and verify that the transducer and heat exchanger are being cooled correctly (see ISP-3600 User Manual for details).
- e. Set the ultrasonic amplitude to 80 % (see ISP-3600 User Manual for details). Note that this setting can be adjusted up or down to optimize the results.
- f. Initiate ultrasound and start timing. Try to maintain the processed liquid temperature at 45 – 60 °C (113 – 140 °F) throughout processing (you may temporarily disconnect the heat exchanger's cooling lines if the processed liquid becomes too cold).
- g. **i). For users with access to particle size analysis (preferred).** After processing for 1 hour, 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.
ii). For users without access to particle size analysis. Continue the process for about 1 hour. Deactivate ultrasound.
- h. Allow your nanoemulsion to stir, recirculate and cool for 10 minutes.
- i. Stop the pump, reverse its direction and start it again in order to collect all of the nanoemulsion from the tubing, heat exchanger, and reactor chamber into the storage tank with mixer.
- j. Stop the pump again and return its direction to the original setting.

4

Filtration:

In this step, you will use the 1.2 micron 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 1.5" sanitary fitting
2. Peristaltic pump with 1/2" ID silicone hose
3. 1.5" sanitary to 1/2" hose ID adapter
4. 1.5" sanitary clamp
5. 1.5" 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 approximately 100 – 150 ml/min, pass the nanoemulsion 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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