

Step-by-step guide to sonicate CNTs using the ultrasonicator probe:

1. Tuning

For tuning it is necessary that the horn is not in contact with anything. Perform the following procedure as quickly as possible since running the horn in air for a long time might damage it.

- a. Turn the power knob fully counter-clockwise to zero.
- b. Turn the sonicator on.
- c. Wait until the machine prompts you that “For Tuning Procedures...”
- d. Press **TUNE**. “Tuning – Probe Active” is displayed.
- e. Turn power knob up until the power bar () is at about 20 %.
- f. Minimize the power on the bar by turning the tune knob.
- g. Increase the power by turning the power knob. Always keep the power below 70 %. A normal value is 50 %.
- h. Turn the tune knob again to minimize power. Repeat steps e and f above until you reach maximum power of the probe you are using (For the microprobe that limit is marked on the power knob as “Microtip limit” .
- i. Decrease the power to zero by turning the power knob.
- j. Press **TUNE** to end the tuning cycle.
- k. Power off the sonicator.

2. Programming

Arrange probe, cooling beaker etc. now as described in 3. Make sure the door is closed afterwards.

- a. Turn the sonicator on. Wait for message “For Tuning Procedures...”
- b. Press **CLEAR** to skip tuning.
- c. Press **PROGRAM DATA** twice.
- d. Set total procedure time. This is in fact the total ON time of the sonicator. ¹
- e. Press **ENTER**
- f. Set ON time. This is the duration of one ON half-cycle.
- g. Press **ENTER**
- h. Set OFF time. This is the duration of one OFF half-cycle.
- i. Press **ENTER**
- j. Press **START STOP** and turn power knob to desired level.
- k. When the program is finished, press **CLEAR**, turn the power knob to zero and power off the device.

Options:

- press **PAUSE** to interrupt and continue processing

¹ The ON time is the only time that contributes to the total time. So, we had 0.5 seconds ON and 0.5 seconds OFF, and set the timer to 1 hour (in part 2.d), the sonicator would take a total of two hours to finish. If we set the OFF time to 0.75 seconds (and say, ON time to 0.5 seconds), it would pulse ON every 1.25 seconds for a duration of 0.5 seconds.

- press **PROGRAM DATA** to review parameters
- press **START STOP** to abort.

3. Sonicating CNTs

Fill cooling beaker with ice cubes and water

Suspend the vial containing the CNTs and solvent in the sonicator box, such that the microprobe in the vial and is about 3 mm above the bottom of the vial.

Max power is about 600 W, so if you set power to 10 % on the bar it is roughly 60 W. The power delivered to the CNTs depends on the solvent and probe shape and spacing.