

Recommended Operating Guidelines for the TurboVap II Concentration Workstation

Our TurboVap II customers have been successful obtaining excellent recoveries for all semivolatiles organic compounds (BNA, PAH, PCB, Pesticides, TPH/DRO, Herbicides). There are many factors that can impact the recoveries, such as client sample matrix, temperature, humidity, and extraction solvents. After gathering information from our customers, we have developed the guidelines below that will help your laboratory determine its optimum conditions for the TurboVap II.

The Most Common Misconceptions on Setting TurboVap II Conditions

“Mild conditions are best” - False. With many manual methods of concentration for semivolatiles, “milder conditions” typically result in improved recoveries. This is not the case with the TurboVap II. Our customers have told us that the longer a sample extract takes to concentrate, the lower the recoveries have been. This is because the water bath temperature and the nitrogen pressure work together to evaporate the solvent, while rinsing down the side walls of the tube. In other words, one depends on the other and good recoveries cannot be expected by increasing just water bath temperature or just flow rate.

“Set temperature below the boiling point of the solvent” - Partially False. In most situations, the TurboVap II bath temperature is set above the boiling point of the solvent because the cooling effect of the nitrogen on the surface of the solvent lowers the temperature of the solvent. Therefore, the water bath may be set to 45 °C, but the temperature of the solvent can actually be at about 41 °C.

“ If I have dark extracts, I cannot use the TurboVap II” - False. If you have extracts darker than a dark amber color, you cannot use SENSOR endpoint. In this situation, use TIMED endpoint. Labs have recommended concentrating all their “normal” samples with sensor endpoint and setting aside their darker extracts to concentrate together, using TIMED endpoint. Using manual methods, these extracts would require more attention as they concentrate. With TIMED endpoint on the TurboVap II, estimate a set time for concentration. At the end of this time, check the sample and continue

if necessary with another selected amount of time. This still allows you to concentrate in an automated manner.

General Guidelines

- The shorter the concentration times, the better the recoveries (180 mL MeCL should take 30-45 minutes).
- Keep the Nitrogen pressure as high as you can, without splashing; thereby increasing the pressure as the volume decreases.
- The nitrogen is creating a patented vortex shearing along the sides of the TurboVap II tube. This facilitates the rinsing as the sample concentrates, which results in better recoveries of analytes. Therefore, if you start your pressure at 10psi with 180mL, and keep it at 10 psi when the volume is at 50 mL, 10 psi is not enough pressure to rinse the tube when the level of the solvent is further away from the nitrogen nozzle.
- Bath temperatures for Methylene Chloride should be 40-45 °C; nitrogen pressures 10-20 psi.
- Bath temperatures for Methylene Chloride + Acetone mixtures should be closer to the 45 °C range
- Nitrogen pressures 10-20 psi for 200 mL tubes and 7-20 psi for 50 mL tubes
- Avoid splashing - pressure may be too high when sample tube is full
- If there is water in the extract due to extremely humid conditions in the laboratory, one of two things may help.
 - Use higher bath temperatures; try 2 °C increases
 - Place a small piece of aluminum foil over each sample tube. Let the Nitrogen nozzle poke through the foil and create an additional small exit hole in the foil using a sharp object. This creates a "closed cell" environment that can minimize the amount of humid air passing over the surface of the tubes.
- Solvent exchange can be done directly in the TurboVap II tube. After the initial solvent has concentrated, add your aliquot(s) of exchange solvent by rinsing down the side walls of the TurboVap II tube. Temperature may be increased at this time and concentration is continued.
- Prolong the life of the sensors by keeping the water bath clean (use Clear Bath and replace water periodically).

Removing the Final Extract from the TurboVap II Tube

Many chemists are skilled at traditional quantitative transfers. Because the TurboVap II tube is graduated at the 1mL and 0.5mL mark (with a 5% tolerance), a traditional quantitative transfer is not required. The sample can be brought to a typical final volume of 1mL in the TurboVap II tube and then the extract can be transferred to the appropriate autosample vial (or other container if cleanup is required). However, if your laboratory's methods require a quantitative transfer to follow current SOP's, please still follow the below recommended guidelines.

Caliper worked with a TurboVap II customer and discovered that using the below mentioned technique, analyte recoveries could be significantly improved from 10-20%.

- Step 1:** Concentrate your extract following the "Recommended Operating Guidelines" on reverse side.
- Step 2:** Whether you selected TIMED or SENSOR endpoint, remove the sample from the warm bath at the sound of the beep.
- Step 3:** Hold the TurboVap II tube within the line of sight.
- Step 4:** Using a 9" disposable pipette, add enough fresh solvent to bring the sample to the 1mL mark by rinsing down the side walls of the TurboVap II tube in a swirling motion at the point just above where the tube narrows.
- Step 5:** Take the entire 1mL sample into the pipette and rinse the same lower portion of the TurboVap II tube.
- Step 6:** Repeat the above technique 2 more times. By the time you are done, the 1mL will have evaporated to about 0.5mL.
- Step 7:** Repeat Step 4 with fresh solvent and bring to your final 1mL mark. (If 1mL is not your desired final endpoint, add the appropriate amount.)
- Step 8:** Using the same pipette, your 1mL sample is now ready to transfer to autosampler vial. (If 1mL is not your final endpoint, perform a quantitative transfer.)