

Handling, Maintenance, and Storage Guidelines for PSI-211 and PSI-219

(Version 7.0, updated November 2022)

(1) Appearance of the ink when you receive it

- The ink will be black in color and will be viscous

(2) Storage of the ink when you receive it

- The ink should be stored in a refrigerator at a temperature between 2 and 9 degrees Celsius
- Do not freeze the ink (do not place in the freezer / do not expose to temperatures ≤ 0 degrees Celsius)

(3) Optimal pH range of the ink during printing

- The pH of the ink should be maintained at a value between 5.74 and 5.78 (at a temperature between 20 and 23 degrees Celsius) while it is printed

(4) Optimal range of relative humidity for printing the ink

- The local environment of the screen printer should have the highest humidity possible without condensing droplets of moisture on the apparatus. This type of “spot humidification” can be achieved with the use of a small humidifier and is also applicable when the ink is printed by hand.

(5) How to adjust pH of the ink

- Remove the ink from the refrigerator and allow it to warm up to room temperature
- Prepare a 0.50 % wt. solution of ammonium hydroxide (pH-increasing solution). Use deionized water and a high purity grade of ammonium hydroxide (e.g. cleanroom grade) to prepare the solution. Store the solution in the refrigerator. It has a maximum shelf life of 10 days.
- Calibrate your pH probe in buffer solutions of pH 4 and pH 7. For laboratory use, we recommend Hanna Instruments FC210B or FC240B pH probes.
- Place the calibrated pH probe in the ink and begin to mix the ink at a low speed
- A stainless steel spatula or a small handheld mixer or the pH probe itself may be used for mixing small masses of ink (≤ 500 g) and an overhead mixer may be used for larger masses of ink (> 500 g)
- Add in a dropwise fashion the 0.50 % wt. solution of ammonium hydroxide to the mixing ink until the target pH of the ink is achieved
- Stop the mixing of the ink and remove the pH probe when the target pH is achieved
- The ink is now ready to be used or stored
- Do not increase the pH of the ink above 5.85

(6) Appearance of the ink when the pH is changed

- When the pH of the ink is less than 5.74, the ink is very viscous, has a pronounced gel-like consistency, is clumpy, and is brown in color. Some phase separation will be observed when the pH is lower than 5.65. The ink will be restored when the pH is increased to a value between 5.74 and 5.78.

- When the pH of the ink is between 5.74 and 5.78, the ink is viscous, has a gel-like consistency, and is black in color
- When the pH of the ink is between 5.78 and 5.85, the ink is less viscous, has very little to no gel-like consistency, is black in color, and will dry more rapidly

(7) Handling of the ink before it is printed with a screen printer

- Remove the ink from the refrigerator and allow it to warm up to room temperature
- Mix the ink with a stainless steel spatula or a small handheld mixer or the pH probe (for an ink mass \leq 500 g) or with an overhead stirrer (for an ink mass $>$ 500 g)
- Measure the pH of the ink with a calibrated pH probe while the ink is mixing
- If the pH of the ink is in the optimal pH range for printing (between 5.74 and 5.78), the ink is ready to be used
- If the pH of the ink is less than 5.74, the pH of the ink may be increased by following the procedure in (5) **How to adjust the pH of the ink**

(8) Cleaning of the squeegee and the screen immediately after printing

- Follow the guidelines in the Cleanup Section on pages 3 and 4 of the [PSI-211 and PSI-219 Screen Ink User Guide](#) (separate document)

(9) Storage of the ink after it has been printed with a screen printer

- Measure the pH of the ink with a calibrated pH probe while the ink is mixing
- If the pH of the ink is in the optimal pH range for printing (between 5.74 and 5.78), the ink should be transferred to a container(s) with a small amount of headspace
- If the pH of the ink is less than 5.74, increase its pH to a value between 5.74 and 5.78 by following the procedure in (5) **How to adjust the pH of the ink**
- Transfer the ink to a container(s) with a small amount of headspace
- The ink may now be refrigerated between 2 and 9 degrees Celsius



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The web links to vendors which sell the laboratory-scale equipment and cleanroom-grade ammonium hydroxide which are used in ink pH adjustment at NovaCentrix are found below.

(1) Oakton pH 5+ meter

<http://www.4oakton.com/proddetail.asp?parent=12&prod=375&seq=1&TotRec=9>

(2) Hanna Instruments FC210B pH probe (glass body)

<https://hannainst.com/fc210b-foodcare-ph-electrode-for-milk-yogurt-and-creams.html>

(3) Hanna Instruments FC240B pH probe (small-diameter, stainless steel body)

<https://hannainst.com/fc240b-small-diameter-foodcare-ph-electrode-with-stainless-steel-body.html>

(4) Oakton WD-35613-13 Automatic Temperature Compensation (ATC) Probe, Stainless Steel

<http://www.testequipmentdepot.com/oakton/probes-and-electrodes/atc-probes/automatic-temperature-compensation-atc-probe-ss-wd-35613-13.htm>

(5) Ammonia solution 29 %, Cleanroom MB for the electronics industry [manufactured by KMG]

<https://pr.vwr.com/store/product/9693443/ammonium-hydroxide-29-cleanroom-mb>

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