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## **Handling, Maintenance, and Storage Guidelines for Spray Ink SPI-508**

(Version 4.0, updated June 2021)

### **(1) Appearance of the ink when you receive it**

- The ink will be black in color and will have a low viscosity

### **(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

### **(3) Optimal pH range of the ink during printing**

- The pH of the ink should be maintained at a value between 5.70 and 5.95 (at a temperature between 20 and 23 degrees Celsius) while it is printed

### **(4) 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 ( $\leq 500$  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 6.05

### **(5) Appearance of the ink when the pH is changed**

- The ink is more viscous when the pH is less than 5.70
- The ink has low viscosity when the pH is between 5.70 and 5.95
- The ink is more viscous when the pH is greater than 6.05 and will undergo irreversible nanoparticle agglomeration

### **(6) Handling of the ink before it is printed with an airbrush or other spray system**

- Remove the ink from the refrigerator and allow it to warm up to room temperature
- A stainless steel spatula or a small handheld mixer or the pH probe itself may be used for mixing small masses of ink ( $\leq 500$  g) and an overhead mixer may be used for larger masses of ink ( $> 500$  g)



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- 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 5.70 and 5.95), the ink is ready to be used
- If the pH of the ink is less than 5.70, the pH of the ink may be increased by following the procedure in (4) **How to adjust the pH of the ink**

**(7) Cleaning the ink off equipment or any other surface**

- Prepare a 1 L solution of “soapy water” with 1 part per volume of Dawn or Palmolive (or any particle-free or liquid detergent detergent) and 19 to 20 parts per volume of deionized water
- Pour the “soapy water” solution into a 1 L spray bottle
- Spray the “soapy water” onto the surface to be cleaned
- Wipe up the “soapy water” residue with paper towels or a foam wiper. The paper towels should be placed in a solid silver waste stream vessel.
- Spray deionized water onto the surface after all of the ink has been cleaned. Wipe clean with a paper towel or foam wiper.

**(8) Storage of the ink after it has been printed with an airbrush or other spray system**

- 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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Web links to vendors which sell the laboratory-scale equipment and cleanroom-grade ammonium hydroxide which are used in ink pH adjustment at NovaCentrix:

**(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**

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

**(3) 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>

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

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

All questions about the ink or printing of the ink should be directed to **Ronald I. Dass** ([ron.dass@novacentrix.com](mailto:ron.dass@novacentrix.com))