

Determination of Solids and Silver Content of PFI-500

(Version 2.0, updated January 2020)

Equipment required:

- (1) High-precision analytical balance (± 0.0002 g)
- (2) Aluminum weighing pan (may have a mass between 0.9000 g and 1.0000 g)
- (3) Hot plate or oven capable of achieving temperatures of 80°C and 140°C (and if possible, 250°C and 425°C)

Procedure:

In order to correctly determine the solids content at 140°C and the Ag content (at 425°C) of PFI-500 in a bottle or container, the steps below should be followed:

(1) Properly mix room-temperature PFI-500 to ensure a uniform dispersion of the silver within the ink bottle or container (homogenization). A stainless steel spatula or a small handheld mixer 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). In order to prevent evaporation of water during mixing with a handheld or overhead mixer, a low mixing speed should be used and the mouth of the bottle / container covered with some type of conformable, non-reactive film (for example, Parafilm).

(2) Tare (zero) the analytical balance and place a clean and empty aluminum weighing pan on the balance stage. Record the mass of the empty pan (± 0.0002 g).

Mass of empty aluminum weighing pan =

(3) Without taring (zeroing) the analytical balance, add ~ 0.30 g to 0.40 g of the well-mixed, room-temperature PFI-500 to the empty aluminum weighing pan. The ink in the bottle or container should be continuously mixed while it is being added to the aluminum weighing pan. Ensure that the ink is added near the middle of the weighing pan and not on the inside vertical side of the pan or on the outside of the pan. Record the combined mass of the aluminum weighing pan and room-temperature PFI-500 (± 0.0002 g).

Combined mass of aluminum weighing pan and PFI-500 =

(4) Remove the aluminum weighing pan with the ink from the analytical balance. Gently move the ink around in the pan so that it coats only the base of the aluminum weighing pan. A simple rotation of the pan at different vertical angles will accomplish this. Ensure that the ink does not coat the inside vertical side of the pan. This step should take less than 10 seconds.

(5) Place the aluminum weighing pan with the room-temperature PFI-500 on a hot plate or in an oven which was previously heated to 80°C. Do not spill the ink on the hot plate or in the oven. Heat the ink at 80°C for 10 min.



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(6) Raise the temperature of the hot plate or the oven to 140°C. Heat the ink sample at 140°C for 10 min.

(7) Carefully remove the aluminum weighing pan from the hot plate or oven (after 10 min at 140°C) and place it on the stage of the previously-zeroed analytical balance. Record the combined mass of the aluminum weighing pan and PFI-500 residue (± 0.0002 g). The PFI-500 residue will have a yellow to gold color with a slight brown tint.

Combined mass of aluminum weighing pan and PFI-500 residue (at 140°C) =

(8) The solids content of the PFI-500 (at 140°C) in the bottle or container can be calculated by the following equation:

$$\left[\frac{\text{Mass in (7)} - \text{Mass in (2)}}{\text{Mass in (3)} - \text{Mass in (2)}} \right] * 100$$

Solids content (at 140°C) of PFI-500 in the bottle or container =

Solids content (at 140°C) of PFI-500 recorded in the technical certification / COA =

Time and date of solids content (at 140°C) determination:

(9) Place the aluminum weighing pan with the PFI-500 residue on the hot plate or in the oven. Raise the temperature of the hot plate or the oven to 250°C. Heat the ink sample at 250°C for 10 min.

(10) Raise the temperature of the hot plate or the oven to 425°C. Heat the ink sample at 425°C for 10 min.

(11) Carefully remove the aluminum weighing pan from the hot plate or oven (after 10 min at 425°C) and place it on the stage of the previously-zeroed analytical balance. Record the combined mass of the aluminum weighing pan and PFI-500 residue (± 0.0002 g). The PFI-500 residue will have a silver-white color with a slight gray tint.

Combined mass of aluminum weighing pan and PFI-500 residue (at 425°C) =

(12) The Ag content of the PFI-500 in the bottle or container can be calculated by the following equation:

$$\left[\frac{\text{Mass in (11)} - \text{Mass in (2)}}{\text{Mass in (3)} - \text{Mass in (2)}} \right] * 100$$

Ag content of PFI-500 in the bottle or container =

Ag content of PFI-500 recorded in the technical certification / COA =

Time and date of Ag content determination:

All questions about this procedure should be directed to **Ronald I. Dass** (ron.dass@novacentrix.com)