

FluoroPel and Low Retention Pipette Tips

Low retention pipette tips help leave no sample behind during pipetting. Standard pipette tips can have properties that cause surface binding. Surface binding results in retention of droplets or thin films of residual material in the pipette tip during dispensing. Trace amounts of residual material can materially affect the volume of sample dispensed. The magnitude of this error is greater with smaller volume tips such as those used for 20 μ l, 10 μ l or smaller sampling.



FluoroPel low retention polymer coatings are a great choice to reduce error when pipetting buffers, surfactants, viscous liquids and other materials. FluoroPel coated tips improve pipetting accuracy, save reagent costs and make experimental work more reproducible. The goal of this paper is to introduce the methods used for coating tips with FluoroPel.

Materials and Methods

The FluoroPel was synthesized at Cytonix in Maryland USA. FluoroPel is available internationally by calling or emailing Cytonix. The concentration of FluoroPel used was 0.25% - 0.5% (PFC80 from Cytonix).

The dry-cleaning machine was a Renzacci (www.renzacci.it/eng/prodotti/Default.aspx) instrument modified to coat tips and to recycle solvent. The goals of the modifications made to the dry-cleaning machine were to make the wash and spin cycles very gentle and to reduce loss in the solvent filters.

Program Summary

1. Pump fill (5), valves (14) and (17); 1:30 minutes
2. Washing (1) and (2); 3:00 minutes
3. Pump Drain (5), valves (11) and (23); 1:30 minutes
4. Blower (7), heaters (8) at 40°C; 3:15 minutes
5. Blower (7), chiller (6) at 10°C; 2:30 minutes



General Coating Guidelines

Initially fill the tank with 25 gallons of PFC80 and 0.5% polymer concentration. For continued runs the polymer concentration should be maintained at approximately 0.25% and the solvent level close to 24 gallons

The objective is to conserve solvent and ensure coating of the tips.

- 1st Run the chill cycle a few minutes prior to loading tips. This condenses any solvent vapors in the chamber.
- 2nd Open the chamber door and load the tips in a mesh bag (10,000-30,000) into the chamber. Close the door.
- 3rd Pump the polymer and solvent mixture into the chamber until the chamber is almost half full.
- 4th Slowly rock (half rotation) the chamber for approximately 2 minutes ensuring a complete wetting of the tips
- 5th Drain the chamber and let the tips rest in the bags while draining.
- 6th Continue draining and to assist in draining the tips of residual solvent a quick rotation helps (spin), but limit any spin time to avoid damage to the tips. 1-2 sec spin is adequate. This step can be repeated as desired.
- 7th With tips in the chamber rock the chamber and turn on the fan with heat. Continue for approx. 3 minutes
- 8th Continue rocking with fan and chill 3-5 minutes
- 9th Repeat fan and heat followed by fan and chill



Depending on results, determine if the tips are dry, if not increase the heat and chill steps. The goal is to recover the maximum amount of solvent while also coating the tips with polymer.

Results will vary with different machines. Customize your program for your operation.

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Quality Control

Three tip from every mesh bag should be tested for low retention using green food coloring from McCormick. Everyday a 1 X 3 inch piece of Microscope glass should be dipped in the FluoroPel from the dry-cleaning machine and the color of the rainbow pattern inspected. Every three days the FluoroPel concentration verification procedure needs to be conducted

FluoroPel Concentration Verification Procedure

A. Equipment Required:

1. Precision balance with 0.001 gram resolution.
2. Disposable Weighing Dish – small disposable aluminum foil dishes of approximately 60 mm diameter.
3. 5ml or larger plastic syringe.
4. 20-micron coffee filter

B. Process:

1. Turn balance on and tare to show 0.000 grams
2. Weigh the empty dish with the syringe and record the weight as **Tare-Weight**.
3. Extract 4 ml to 5 ml of FluoroPel from the bath with the syringe.
4. Record full syringe together with the empty dish as **Gross-Weight**.
5. Empty contents of the syringe into the dish carefully; ensure syringe is completely emptied only into the dish.
6. Evaporate solvent completely by leaving dish for 10 hours at room temperature (preferably overnight) or by heating at 100 - 150°C for 1 hour (or overnight).
7. Make sure the display on the balance shows zero again. Put “dry” dish and syringe on the balance and record the **Net-Weight**.
8. For more accurate results three measurements are recommended and take the average. For even more accurate results use a large syringe and 75 ml of FluoroPel for the concentration test

C. Calculations:

Gross-Weight minus Tare-Weight = Fluid-Weight

Net Weight – Tare-Weight = Solid-Weight.

Solid-Weight / Fluid-Weight X 100 = Percent-Solids.

The recommended solids content is between 0.2 – 0.5%.

If the solids content is below 0.2% the bath needs more fresh FluoroPel concentrate If the solids content is above 0.5%, solvent has evaporated and more solvent is required. If there are any particles, dust or debris the FluoroPel solution needs to be filtered a 20-micron coffee filter.

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