

Experiment 2 — Pilot Plant Manufacturing Trial Report

Focus: Viscosity Optimization / Salt Curve Evaluation

Document Type: Pilot Batch Evaluation

Program: CLEARSCALP Scale-Up

Run Number: PP-17-026

Operator: Luis Herrera

Date Executed: 18-Feb-2026

Trial Purpose

Assess sodium chloride thickening response in sulfate-free shampoo base following complaints that previous pilot batch lacked consumer-perceived richness.

Batch Size

75 kg pilot scale

Raw Materials Used

Material	Supplier	Batch	Qty
RO Water	Plant Utility	UTIL-RO-2	48.2 kg
Sodium Lauroyl Sarcosinate	Innospec	SAR-25-X1	11.25 kg
CAPB	Evonik	CAPB-44B	5.30 kg
Sodium Chloride	AkzoNobel	NACL-77	0.62 kg
PEG-120 Methyl Glucose Dioleate	Lubrizol	PEG120-9A	1.10 kg
Mint Fragrance	Givaudan	MINT-09	0.61 kg

Equipment

- 100 L stainless mixing tank
- Lightnin agitator
- Inline recirculation loop
- Hanningfield powder feeder

- Anton Paar viscometer
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Manufacturing Notes

Initial Charge

RO water transferred to main vessel.

Heating not used for this run.

Agitation started at ~140 rpm.

Surfactant Incorporation

Sarcosinate added first through powder funnel.

Major issue:

- aeration increased rapidly
- foam climbed near upper sight glass

Action taken:

- temporarily stopped recirculation loop
- reduced agitator speed

CAPB added afterward.

System stabilized after ~20 min.

Thickener Stage

PEG-120 Methyl Glucose Dioleate added at ambient temperature.

Incomplete dispersion noted initially.

Operator comment:

“Material sat on surface for several minutes before pulling in.”

Salt Curve Evaluation

NaCl added in increments.

Addition Stage Estimated NaCl Level Observed Viscosity

Stage 1	0.3%	4,200 cP
Stage 2	0.6%	6,100 cP
Stage 3	0.9%	5,000 cP

Observation:

- viscosity peaked around 0.6%
- further salt caused thinning

Fragrance Addition

Mint fragrance added below 30°C.

No visible instability observed.

Final QC Snapshot

Property	Result
Final pH	5.62
Appearance	slightly opaque
Final Viscosity	6,050 cP
Odor	acceptable
Fill Behavior	acceptable

Deviations / Concerns

1. Significant foaming during Sarcosinate charging.
2. Thickener difficult to wet out at ambient conditions.
3. Salt sensitivity higher than expected.

Recommendations

- Pre-dilute PEG-120 before addition.

- Maintain NaCl below 0.7%.
- Investigate antifoam for pilot-scale charging.