

Viscosity in Cosmetic Formulation

A practical guide to texture, flow, testing, and thoughtful adjustments

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THE FORMULATORS LAB® | JOAN MORAIS

Understanding Viscosity

How your formulation resists flow

TONER



Flows readily

SHAMPOO



Pours in a ribbon

LOTION



Flows with more body

CREAM



May hold a soft peak

Illustrative examples. Actual flow depends on the complete formula and test conditions.

Compare under the same conditions

Temperature • Sample age • Mixing history • Resting time

Thicker is not always better. Match the texture to the product and packaging.

Professional Training in Cosmetic Formulation

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In This Guide

Learn what viscosity tells you, how to observe and measure flow, and what to check before adjusting a formula. Use the worksheet to compare batches under consistent conditions.

Begin with one formulation. Careful observations and good records will help you connect your ingredients and process with the finished texture.

Understanding Texture and Flow

Viscosity measures resistance to flow. Low-viscosity liquids flow easily; higher-viscosity liquids resist flow more. Slip, cushion, tackiness, elasticity, and firmness are other parts of texture.

Term	What it means	Why it matters
Viscosity	Resistance to flow under stated conditions	Helps compare batches and plan dispensing
Shear-thinning	Viscosity decreases as shear rate increases	Can help a cream spread more easily
Thixotropy	Viscosity decreases over time under sustained shear; structure recovers at rest	Mixing history and resting time affect the result
Firmness	Resistance to deformation or penetration	Useful for solid balms, sticks, and butters

Observe Before You Adjust

- Pour: Does the sample run, ribbon, or barely move?
- Lift: Does it drip from a spatula, mound, or hold a peak?
- Tilt: How readily does it move in its container?
- Spread: Is there useful slip, or does it drag or pill?
- Dispense: Test the actual pump, tube, bottle, or jar.

Use the same sample amount, temperature, container, and resting time for comparisons. These observations do not give a numerical viscosity value.

Temperature and Product Age

A common reference temperature is 25°C / 75°F but use the temperature in your established method. Let the sample reach that temperature before testing. Compare at a defined age, such as 24–48 hours and one week during development. Hydration, cooling, and crystallization can change texture; these observation points are not a complete stability protocol.

A thicker product is not automatically more stable or more effective. Set your target around intended use, performance, and packaging.

Measuring and Adjusting Viscosity

A rotational viscometer measures resistance as a spindle rotates in a sample. For non-Newtonian products, report apparent viscosity together with the complete test method. A rheometer can examine flow and structure in more detail.

Units: 1 cP = 1 mPa·s. 1 Pa·s = 1,000 cP. Follow the instrument instructions for geometry, sample setup, and valid torque range.

Choose the Adjustment for Your System

Product system	Review before adjusting
Lotions and creams	Emulsifier, fatty alcohols, gums or polymers, oil phase, pH, mixing, and cooling
Shampoos and cleansers	Surfactant blend and active matter, pH, electrolytes, fragrance, solubilizers, and preservative
Balms and butters	Wax and butter ratios, oils and esters, crystallization, cooling, firmness, and melting behavior

Salt thickens only suitable surfactant systems. In a responsive blend, adding more salt beyond the viscosity peak can make the product thinner. Test small measured additions rather than assuming more is better.

A Practical Troubleshooting Checklist

- Confirm weighing, pH, temperature, and the manufacturing procedure.
- Allow adequate hydration, cooling, and resting time.
- Check supplier instructions and ingredient compatibility.
- Investigate separation, unexpected odor, or changes during storage before adding thickener. Do not rework a potentially contaminated batch.
- Make a small trial batch. Change one variable and document it.
- Keep the revised formula at 100%. Recheck preservative and other ingredient concentrations.
- Repeat appropriate stability, preservation, packaging, and performance testing after changes.

Changing texture is a formulation decision. More thickener may increase drag or stringiness without improving the product.

Viscosity Observation Testing Worksheet

Visual Flow and Packaging Observations

Use one record for each test. Compare samples using the same amount, temperature, resting time, and method. These observations describe texture and flow; they do not provide a numerical viscosity value.

Product / formula version: _____

Batch number / production date: _____

Test date / product age: _____

Sample temperature / amount: _____

Mixing history / preparation / resting time: _____

Glass Plate Flow Test

Place a measured sample on a clean, dry glass plate. Tilt the plate to a repeatable angle and observe for a set time. Use the same setup for each comparison.

Plate angle / observation time: _____

Distance moved if measured: _____

Flow: runs freely / moves slowly / forms a ribbon / stays in place

Notes: _____

Pouring and Spatula Observations

Does it drip, ribbon, mound, or hold a soft peak? Does it level out after lifting?

Spreading on the Glass Plate

Does it spread easily or resist movement? Note drag, stringiness, clumps, or uneven spreading.

Packaging and Dispensing

Package type: pump / squeeze bottle / tube / jar / other: _____

Pump or tube: easy to dispense? Consistent amount? Sputtering, dripping, clogging, or excessive force?

Jar: holds shape or levels out? Easy to scoop? Too firm, runny, grainy, or sticky?

Appearance and Changes After Resting

Note bubbles, separation, surface liquid, color, or texture changes. Repeat the same tests at a defined sample age.

Comparison with reference batch / desired texture: _____

Adjustment / next step / retest date: _____

Viscosity Testing with a Rotational Viscometer Worksheet

Use a separate record for each test. Compare results only when the method and sample preparation match. Establish acceptance limits from validated development work rather than generic product ranges.

Product / formula version: _____

Batch number / production date: _____

Test date / product age: _____

Instrument model / spindle or geometry:

Speed rpm or shear rate / torque: _____

Temperature / sample amount: _____

Container / immersion depth: _____

Mixing history / preparation / resting time:

Reading time / viscosity value / unit: _____

Appearance / bubbles / separation: _____

Pour / spread / packaging observations:

Adjustment / next step: _____

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Technical references: AMETEK Brookfield, Viscosity and Rheology FAQs; Learn About Viscosity.
www.brookfieldengineering.com. Follow the documentation for your exact instrument and ingredient grades.