Upscaling Cosmetic Formulations

From 100 Gram Samples to 1 Gallon Production Batches

What Is Upscaling?

Upscaling means:

Increasing the size of a cosmetic formulation while keeping the ingredient percentages the same.

Formulators upscale products when moving from:

- lab samples
- testing batches
- or prototypes

to:

- production batches
- customer orders
- retail manufacturing
- or larger inventory preparation

Why Formulas Are Written in Percentages

Professional cosmetic formulas are written in percentages because percentages:

- make formulas easy to scale
- maintain ingredient ratios
- simplify manufacturing
- help calculate costs
- and improve batch consistency

The percentages stay the same no matter the batch size.

Only the ingredient weights change.

What Does QS Mean?

QS means:

Quantity Sufficient

This means: Add enough of an ingredient (usually water) to bring the formula to 100%.

Example Formula

Basic Body Wash Formula

Ingredient Type	Percentage
Water (QS)	60%
Anionic + Amphoteric + Nonionic Surfactants	26%
Humectant	6%
Plant Oil	2%
Refatting Agent	1%
Thickener	1%
Extract	2%
Preservative	1.5%
Essential Oils	0.5%

100 Gram Sample Batch

A 100 gram batch is easy because:

- percentages directly equal grams.

100 Gram Sample Batch Example

Ingredient Type	Percentage	Weight
Water	60%	60 g
Surfactants	26%	26 g
Humectant	6%	6 g
Plant Oil	2%	2 g
Refatting Agent	1%	1 g
Thickener	1%	1 g
Extract	2%	2 g
Preservative	1.5%	1.5 g
Essential Oils	0.5%	0.5 g

Total = 100 grams

Converting 1 Gallon to Grams

1 U.S. gallon =

- 128 oz

To upscale, convert ounces into grams:

$$128 \times 28.35 = 3628.8 \text{ grams}$$

So:

- 1 gallon ≈ 3628.8 grams

Formula for Scaling

Ingredient Weight Formula

$$\text{Ingredient Weight} = \text{Batch Size} \times \text{Percentage}$$

Remember:

- Convert percentages into decimals.

Examples:

- 26% = 0.26
- 6% = 0.06
- 1.5% = 0.015

Upscaled 1 Gallon Batch

Ingredient Type	Percentage	Weight
Water	60%	2177.3 g
Surfactants	26%	943.5 g
Humectant	6%	217.7 g
Plant Oil	2%	72.6 g
Refatting Agent	1%	36.3 g
Thickener	1%	36.3 g
Extract	2%	72.6 g
Preservative	1.5%	54.4 g
Essential Oils	0.5%	18.1 g

Easy Shortcut Scaling Method

Determine the Scale Factor

Original batch:

- 100 grams

New batch:

- 3628.8 grams

$$3628.8 \div 100 = 36.288$$

Scale factor:

- 36.288

This means:

Multiply every ingredient in the original formula by 36.288.

Example:

Original humectant:

- 6 grams

$$6 \times 36.288 = 217.728$$

New humectant amount:

- 217.7 grams

Important Upscaling Notes

When batches become larger:

- viscosity may change
- mixing becomes different
- gums hydrate differently
- heating and cooling times increase
- and fragrance distribution may vary

Always:

- test pH
- monitor viscosity
- perform stability testing
- and evaluate preservation after scaling

Helpful Tools for Upscaling

Recommended Programs

Microsoft Excel

Excellent for:

- automatic scaling,
- costing,
- percentage calculations,
- and batch sheets.

Google Sheets

A free option ideal for:

- beginner formulators,
- cloud-based calculations,
- and quick scaling.

Professional Formulation Tips

✓ Always formulate in percentages
✓ Start with small lab batches
✓ Record every adjustment
✓ Use accurate scales
✓ Test each scaled batch

✓ Keep detailed formulation records
✓ Verify pH after scaling
✓ Evaluate viscosity after production

Formulator Notes

Understanding how to upscale cosmetic formulations is an essential professional formulation skill.

Learning percentages and scaling calculations allows formulators to confidently move from:

- small testing batches
  to:
- larger production runs.

This skill is important for:

- shampoos
- conditioners
- body washes
- lotions
- creams
- serums
- and other cosmetic products

Joan Morais Cosmetics School

Teaching You to Formulate with Nature, Science, and Professional Skill

Become a Cosmetic Formulatorr