



Case Study: The Alpha Arbutin Pigment-Inhibition Strategy

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Subject: Tyrosinase Suppression & Barrier Support

THE FORMULA (Calculated for 100g)

Phase	Ingredient	% Weight	Grams (for 100g)	Function
A	Distilled Water	90.7%	90.7g	Solvent (Vehicle)
A	Vegetable Glycerin	3.0%	3.0g	Humectant
A	Xanthan Gum	0.3%	0.3g	Thickener/Stabilizer
B	Alpha Arbutin	2.0%	2.0g	Active (Pigment Inhibitor)
B	Niacinamide (B3)	3.0%	3.0g	Active (Barrier Support)
C	Preservative (e.g., Geogard ECT)	1.0%	1.0g	Broad Spectrum Protection

2. THE FORMULATION METHOD

1. Phase A Preparation:

Weigh your Glycerin and Xanthan Gum into a small beaker. Mix them together until they form a smooth, paste-like slurry. This prevents "fish-eyes" (clumps) in your serum.

2. Hydration

Slowly pour your Distilled Water over the slurry while stirring constantly. Let it sit for 15–20 minutes until the gel is fully hydrated and clear.

3. Phase B Integration

Add the Alpha Arbutin and Niacinamide directly into the gel. Stir until completely dissolved. These are water-soluble, so they will disappear quickly.

4. Preservation

Add your Phase C (Preservative) and stir well.

5. Critical Step (pH Adjustment)

Use a calibrated pH meter.

- Target Range: 4.9 – 5.5.

How to Adjust PH

Once your preservative is mixed in, you must stabilize the serum. For this specific formula (Alpha Arbutin + Niacinamide), the pH will likely sit too high (around 6.0 to 7.0). You must bring it down to the 4.9 – 5.5 range.

1. Initial Test: Dip your calibrated pH meter, into the room-temperature serum.
2. Adjusting Down (If pH is above 5.5): * Add one drop of Citric Acid solution (50%).
 - Stir thoroughly for at least 60 seconds to ensure the acid is fully distributed.
 - Test again.
 - Repeat this "one drop at a time" process until your meter reads exactly the required range..

3. Adjusting Up (If pH is below 4.9): * If you over-shoot and the serum becomes too acidic, add one drop of Sodium Hydroxide solution (10%).
 - Stir thoroughly and test again.
 - Continue until you are back within the safe zone of 4.9 – 5.5.

The Formulator's Rule: Never rush the pH. If you don't mix and test between every single drop, you'll swing the pH too far and destabilize the Alpha Arbutin.

3. FORMULATOR'S CLINICAL NOTES

- Storage: Store in an amber glass bottle. This molecule is sensitive to light and heat.
- Stability: This is a "Chassis" formula. It is professional because it is stable, but it is basic because it allows you to test the active's performance before adding complex extracts.

Shelf Life & Stability

Optimized for a 12-18 month shelf life when stored in a cool, dark environment. The specific pH target of 4.9–5.5 prevents the degradation of Alpha Arbutin into hydroquinone, ensuring the formula remains clinically active and safe for long-term use.

Professional Formulation Disclaimer: This formulation is provided for educational and investigative research only. While based on clinical stability standards, the final safety, stability, and efficacy of any handmade batch are the sole responsibility of the manufacturer.

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