

5.5 FORMULATING HIGH COVERAGE LIQUID FOUNDATION



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In this lesson, we will cover:

1. How to formulate high coverage liquid foundation.
2. Examples on the market.
3. Formulation template for high coverage liquid foundation.
4. Formulation example for high coverage liquid foundation.
5. Adjusting the formula.

HOW TO FORMULATE HIGH COVERAGE LIQUID FOUNDATION

High coverage liquid foundations are normally formulated as medium to highly pigmented **emulsions**.

Due to containing a high pigment load, they also need enough emollients for the pigments to be dispersed in, and for this reason many high coverage foundations on the market are emulsions made with silicones and water. Silicones are volatile and thus do not leave an oily or greasy skin feel after application. Natural versions use naturally derived esters and light oils instead of silicones. This means that natural foundations are likely to feel a little heavier on the skin compared to silicone-based, conventional foundations.

Good quality high coverage liquid foundation is best achieved using a W/O emulsion type. Oil is the continuous or outer phase, so it makes pigment dispersion much easier, more

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Above: Airless pump bottle

effective and even, compared to an O/W emulsion. In order to create a foundation that contains a high amount of pigments and is still not too greasy on the skin, it is advisable to use W/O emulsifiers that allow for a high water phase. This will make the liquid foundation sink into the skin much more quickly.

Like the other emulsions covered in this module, high coverage liquid foundations also need to contain preservatives, antioxidants and possibly dispersing agents.

Our example formula is packaged into an airless pump bottle, but other packaging can also be used, such as lotion pumps, squeeze tubes or regular cosmetic jars.

High coverage liquid foundations can be applied to the skin using fingertips, makeup brushes or makeup sponges.



EXAMPLES ON THE MARKET



MADARA SKIN EQUAL SOFT GLOW FOUNDATION

€26.4 per 30ml

www.madaracosmetics.com

Product highlights/description:

“Meet the foundation that is perfectly equal to your skin. Born from organic skin care expertise, this light as air mineral foundation worships your skin and shares your values. The zen-equilibrium of soft glow and adjustable coverage creates a smooth, seamless and naturally-radiant skin finish that barely looks made-up. Apply and blend well with the fingers or your preferred applicator.”

INCI: Aloe Barbadensis (Aloe) Leaf Juice, Dicaprylyl Carbonate, Isoamyl Laurate, Zinc Oxide, Butylene Glycol, Polyglyceryl-3 Polyricinoleate, Oryza Sativa (Rice) Bran Oil, Helianthus Annuus (Sunflower) Seed Wax, Oryza Sativa (Rice) Bran Wax, Rhus Succedanea (Wax Tree) Fruit Wax, Polyglyceryl-3 Diisostearate, Sodium Chloride, Sodium PCA, Xanthan Gum, Sodium Dehydroacetate, Paeonia Lactiflora (Peonia) Root Extract, Vaccinium Myrtillus (Blueberry) Fruit Extract, Aluminum Hydroxide, Aroma, Glycolipids, Hydrolyzed Hyaluronic Acid, Sodium Hyaluronate, Ascorbyl Palmitate, Tocopherol, Potassium Hydroxide, Limonene, Linalool, Titanium Dioxide (CI 77891), CI 77492 (Iron Oxide), CI 77499 (Iron Oxide).

Our analysis:

This liquid foundation is a W/O type of emulsion. It likely uses a commercial W/O emulsifier blend called Makibase SEB, consisting of polyglyceryl-3 polyricinoleate and polyglyceryl-3 diisostearate. The emollients included in this formula are very light – dicaprylyl carbonate and isoamyl laurate, with smaller amounts of rice bran oil. Lipid thickeners include sunflower wax, rice bran wax and wax tree wax. They thicken and stabilize the emulsion, as well as give some degree of water resistance to the product. The water phase contains aloe vera juice, humectants (sodium PCA, hyaluronic acid), xanthan gum and regular salt, which functions as a stabilizer. The foundation also contains botanical extracts of peony and blueberry. This product is preserved using sodium dehydroacetate and uses potassium hydroxide and aluminum hydroxide as the pH adjusters. The foundation contains standard mineral pigments – zinc oxide, titanium dioxide and iron oxide.



KJÆR WEIS LIQUID FOUNDATION

\$48 per 30ml

<https://kjaerweis.com>

Product highlights/description:

“Created after years of customer demand, Invisible Touch Liquid Foundation is a serum-like formula that builds from light to medium coverage. Use a little for a fresh-faced, luminous glow, add more for a natural-looking, medium coverage that smoothes, evens and perfects. It’s super-gentle on skin, and has a long-lasting, hydrating, comfortable wear, thanks to the addition of ingredients like certified organic chamomile water, hyaluronic acid, a blend of cold press oils and natural waxes and the Kjaer Weis-exclusive ingredient Dioscorea Batatas, known as the Root of Light.”

INCI: Chamomilla Recutita (Matricaria) Flower Water, Octyldodecanol, Polyglyceryl-3-Diisostearate, Coconut Alkanes, Almond Oil/Polyglyceryl-10-Esters, Rosa Rubiginosa (Rosehip) Seed Oil, Polyglyceryl-6-Polyhydroxystearate, Mica, Olea Europaea (Olive) Fruit Oil, Sodium Chloride, Jojoba Esters, Polyglyceryl-6-Polyricinoleate, Coco-Caprylate/Caprate, Caprylic/Capric Triglyceride, Helianthus Annuus (Sunflower) Seed Wax, Helianthus Annuus (Sunflower) Seed Oil, Dioscorea Batatas Root Extract, Acacia Decurrens Flower Wax, Spilanthes Acmella Flower Extract, Pullulan, Sodium Hyaluronate, Tocopherol, Ascorbyl Palmitate, Magnesium Sulfate, Silver, Polyglyceryl-4-Punicate, Polyglycerin-3, Parfum (Fragrance). May contain +/- CI 77891, CI 77491, CI 77492, CI 77499.

Our analysis:

Another example of a W/O emulsion-based foundation. It contains two W/O emulsifiers, possibly from a commercial product called Emulium Illustro (INCI: Polyglyceryl-6 Polyhydroxystearate (and) Polyglyceryl-6 Polyricinoleate), which is especially useful for products that contain pigments, as it helps with pigment dispersion. Polyglyceryl-3-diisostearate is a second emulsifier. The product contains lipid thickeners (sunflower wax and acacia wax) to stabilize the emulsion. Just like in many other foundations the emollients used are very light – octyldodecanol, coconut alkanes, coco-caprylate/caprate with small amounts of vegetable oils (rosehip oil, olive oil, fractionated coconut oil, sunflower oil). The water phase contains chamomile hydrosol and hyaluronic acid, together with sodium chloride and magnesium sulfate (emulsion stabilizers). For further skin benefits, this foundation contains botanical extracts and a commercial ingredient called Phytocare-PC (INCI: Almond Oil/Polyglyceryl-10 Esters, Polyglyceryl-4 Punicate). The pigments in this product are titanium dioxide and iron oxides.



ERE PEREZ OAT MILK FOUNDATION

€42 per 30ml

<https://ereperez.com>

Product highlights/description:

"Our best-selling and beloved oat milk foundation features star natural ingredients such as oat milk, peach and vitamin E to help nourish your skin throughout the day. This foundation is for a fresh, dewy finish that melts effortlessly into your skin. This foundation is buildable, lightweight and free from impurities so your skin is still able to breathe. No cakey faces here! Available in 8 shades designed to suit a wide range of skin tones. While our shades may look minimal, they are all extremely versatile! Each shade suits a multitude of skin tones and subtle variations. If you are unsure which is the right one for you, please contact us and we will guide you in the right direction."

INCI: Aqua (Water), Coco-Caprylate/Caprate, Glycerin, Polyglyceryl-6 Polyricinoleate, Oat (Avena Sativa) Kernel Extract, Peach (Prunus Persica) Fruit Extract, Tocopheryl Acetate (Vitamin E), Biosaccharide Gum-1, Sodium Anisate, Sodium Levulinate, Magnesium Sulfate, Sodium Salicylate, Ethylhexylglycerin, Citric Acid, Glyceryl Caprylate, Polyhydroxystearic Acid, Potassium Sorbate. May contain +/- Iron Oxides, CI77891, Aluminum Starch Octenylsuccinate.

Our analysis:

This concealer is another example of a W/O emulsion. It contains one emulsifier, polyglyceryl-6 polyricinoleate, which also helps to disperse the pigments to some extent. The oil phase contains a light feeling ester, coco-caprylate/caprate, and the water phase contains water and an emulsion stabilizer – magnesium sulfate. This foundation contains polyhydroxystearic acid which functions as a dispersant for the pigments. The product is preserved using sodium anisate, sodium levulinate, sodium salicylate, ethylhexylglycerin, glyceryl caprylate and potassium sorbate. It uses citric acid as a pH adjuster and for skin benefits, contains two botanical extracts (peach and oat) and moisturizing biosaccharide gum-1. To provide color and coverage it contains titanium dioxide and iron oxides.

FORMULATION TEMPLATE FOR HIGH COVERAGE LIQUID FOUNDATION

Let us have a look at a formulation of high coverage liquid foundation. We will start with the formulation template.

Ingredient type	Function	w/w%
Emollients (eg oils, butters, esters)	Solvent	10-60
Lipid thickeners (eg waxes, fatty alcohols, silica, etc)	Increases viscosity	1-10
Emulsifier	Combines oils and water	3-10
Purified water (deionized), or hydrosols, aloe vera juice	Solvent	30-60
Water-phase thickeners (eg gums)	Increases viscosity	0-3
Stabilizers for W/O emulsion (eg magnesium chloride) – if needed	Stabilizes W/O emulsions	0-1
Humectants – optional	Moisturizes the skin	Up to 3
Pigment mixture	Provides tint/color	Up to 20
Dry powders (eg starch, clay) – optional	Creates a dry skin feel	Up to 5
Dispersant – optional	Eases pigment dispersion	Up to 2
Film-formers (eg acacia gum)	Provides longevity	Up to 10
Fragrance/essential oils – optional	Masking agent for raw materials	Up to 1
Preservative	Prevents spoilage via microbial growth	q.s.*
Antioxidant (eg Vitamin E)	Prevents oxidation	0.05-0.10

*The abbreviation q.s. stands for 'quantum satis' or 'quantum sufficit', meaning an amount which is enough, or an amount which suffices. This is a term used in template formulas because the amount of preservative depends on the preservative itself and the formula.

This template can be used for either a W/O or O/W high coverage liquid foundation. We have provided two different product development briefs and formulation worksheets (one for W/O and one for O/W emulsions) where you can find guidance specific to each type of emulsion.

It is worth noting that W/O emulsions are an advanced emulsion type. This means that when formulating your own high coverage liquid foundation you may wish to begin with an O/W emulsion, which you are probably already familiar with.

When you are ready to formulate your own W/O high coverage liquid foundation we recommend studying our [Formulating Water-in-Oil \(W/O\) Emulsions](#) class, which provides more detailed guidance on this advanced formula type.

FORMULATION EXAMPLE FOR HIGH COVERAGE LIQUID FOUNDATION

PRODUCT DEVELOPMENT QUESTIONS

Product type:

High coverage liquid foundation (W/O emulsion).

Are you formulating to meet a particular standard or certification?

We are using natural ingredients, accepted by COSMOS.

Who is your target audience?

People of all ages, looking for a natural foundation with medium to high coverage.

What is the purpose/function of your product?

To provide coverage for blemishes and other imperfections, and to unify the skin tone.

What properties and qualities do you want your product to have?

Medium viscosity, creamy emulsion. Medium to high pigmentation.

What packaging will your product go in?

30ml airless bottle.

Which solvents are you using and why?

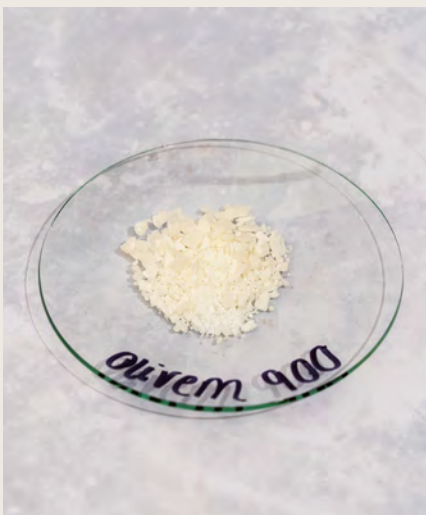
Purified water (deionized), as it is easily accessible and easy to use.

Which water thickeners are you using and why?

Since this is a W/O emulsion we are not using any water-phase thickeners. Instead we have added a water-phase stabilizer (magnesium chloride) to help stabilize this W/O emulsion.

Which humectants are you using and why (if any)?

We are using glycerin to moisturize the skin.



Which emollients are you using and why?

We included liquid emollients that are quick to absorb – squalane, isoamyl laurate, coco caprylate and jojoba oil.

Which lipid thickeners are you using and why?

We are using Olivem 900, because it functions as a co-emulsifier and a thickener. We are also using magnesium stearate, which gels the oils and helps to stabilize the emulsion.

Which emulsifiers are you using and why?

We are using polyglyceryl-3 polyricinoleate, because it is a naturally derived and reliable W/O emulsifier. Other W/O emulsifiers can also be used instead. Olivem 900 functions as a co-emulsifier and stabilizer.

Which pigments are you using and why?

We are using a blend of matte mineral pigments.

Which other ingredients specific to this product type are you using and why?

We are using polyhydroxystearic acid as a dispersant – it helps in preventing mineral pigments from clumping up. Refer to **Lesson 5.1 Introduction to formulating natural concealer and foundation** for more information on, and suppliers of, polyhydroxystearic acid.

In the water phase, we are adding magnesium chloride to further stabilize the emulsion.

We are also including Vitamin E as an antioxidant and Geogard 221 as a preservative.



FORMULA

Phase	INCI name	Trade name	Function	w/w%
A1	Squalane	Squalane	Emollient	2.0
A1	Magnesium Stearate	Magnesium stearate	Stabilizer	0.5
A	Caprylic/Capric Triglyceride	Fractionated coconut oil	Emollient	11.0
A	Coco Caprylate	Coco caprylate	Emollient	9.0
A	Simmondsia Chinensis (Jojoba) Seed Oil	Jojoba oil	Emollient	4.0
A	Polyhydroxystearic Acid	Polyhydroxystearic acid	Dispersant	1.0
A	Various	Pigment mixture	Colorant	14.0
A	Sorbitan Olivatate	Olivem 900	Co-emulsifier	2.0
A	Polyglyceryl-3 Polyricinoleate	Emul PGPR	Emulsifier	4.0
B	Aqua	Purified water (deionized)	Solvent, carrier	48.1
B	Glycerin	Glycerin	Humectant	2.0
B	Magnesium Chloride	Magnesium chloride	Stabilizer	1.0
C	Tocopherol	Vitamin E (95% mixed tocopherols)	Antioxidant	0.1
C	Benzyl Alcohol, Dehydroacetic Acid	Geogard 221	Preservative	0.8
C	Various	Fragrance	Fragrance	0.5



INSTRUCTIONS

1. Prepare your pigment mixture.
2. Mix phase A1 ingredients and heat directly on a hot plate until the powder melts and dissolves in the oil, at approximately 100°C.
3. Add phase A ingredients to A1, blend and mix until pigments are dispersed.
4. Heat phase A to 75°C using a water bath or hot plate.
5. Combine phase B ingredients and mix until dissolved.
6. Adjust the pH of phase B to 4.5-5.5.
7. Weigh the phase B beaker. Record this weight to be used for water loss calculations later. Alternatively, you can cover the beaker with plastic wrap or a silicone cover to prevent evaporation.
8. Heat phase B to 75°C using a water bath or hot plate.
9. Once both phases are at the required temperature, remove phase B from the heat. If the beaker was not covered, weigh this beaker and calculate the difference between this weight and the initial weight. This value represents water lost through evaporation. Add this amount of purified water lost back into the beaker.
10. Very slowly, while constantly stirring, add phase B into phase A. When doing this, ensure each addition of the water phase is completely blended in the oil phase.
11. Using a stick (immersion) blender, briefly homogenize for a couple of seconds to achieve a homogeneous emulsion.
12. Cool the mixture to 45°C, stirring occasionally to help the batch cool consistently.
13. Add phase C ingredients. Mix thoroughly.
14. Pour into an airless bottle.
15. Allow to cool at room temperature.

PRODUCT SPECIFICATIONS

Appearance: Opaque emulsion in tube.

Viscosity: Medium viscosity emulsion.

Color: Various.

Odor: Characteristic of the fragrance.

pH: 4.5-5.5. The pH of our product was 6.9, which we adjusted to 4.5 using 0.04g of 30% citric acid solution.



ADJUSTING THE FORMULA

Using different types of emollients and thickeners will create different structures and skin feels. As this is a W/O emulsion, the emulsifier can be substituted with other W/O emulsifiers. For suppliers and substitution ideas refer to **Lesson 5.1 Introduction to formulating natural concealer and foundation**.

Due to the high percentage of pigments, the emulsion can be unstable, so it requires emulsion stabilizers – both in the oil phase and in the water phase. Changing any of the stabilizers (magnesium stearate, Olivem 900) could decrease the emulsion stability. Instead of magnesium chloride, other salts can be used, eg magnesium sulfate or sodium chloride.

PET RESULTS

This product passed Preservative Efficacy Testing with a Criteria B pass. It is recommended that products which achieve a Criteria B pass are packaged in airless pumps to avoid contamination of products through contact with bacteria on the skin. The results can be found on the following page.

SUMMARY

In this lesson we explained how to formulate high coverage liquid foundation. We shared examples of natural high coverage liquid foundations on the market and provided a formulation template and an example formula for high coverage liquid foundation.



PET RESULTS



HAMILTON

ANNEX NO. 1 TO THE TEST REPORT NO L65149/22/JSHS

RESULTS

Microorganisms	Log reduction					
	T 7	criteria	T 14	criteria	T28	criteria
<i>Escherichia coli</i>	2,77	≥ 3	3,87	≥ 3 and NI	4,96	≥ 3 and NI
<i>Staphylococcus aureus</i>	2,42	≥ 3	3,55	≥ 3 and NI	4,59	≥ 3 and NI
<i>Pseudomonas aeruginosa</i>	2,24	≥ 3	3,08	≥ 3 and NI	4,49	≥ 3 and NI
<i>Candida albicans</i>	1,58	≥ 1	3,29	≥ 1 and NI	3,95	≥ 1 and NI
<i>Aspergillus brasiliensis</i>	0,46	-	0,91	≥ 0	2,10	≥ 1 and NI

$Rx = \lg N_0 - \lg N_x$

N_0 - number of micro-organisms inoculated at time t_0

N_x - number of surviving micro-organisms at each sampling time t_x

NI- no increase in the count from the previous contact time T7,T14,T28 days

**Conclusion: The test confirmed the efficacy of the antimicrobial protection of a cosmetic product after 14 days.
The product meets criteria B.**