

*“Here’s How To Quickly Copy Almost  
Any Cosmetic Formula...”*

# **How To Knock- Off a Cosmetic Formula**

**A 10-Step System For  
Researching, Creating, and Testing  
Existing Personal Care and  
Cosmetic Formulations...**

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# Introduction

## Cosmetic Chemistry

While you may have learned about molecules, organic synthesis, and thermodynamics in college chemistry courses, you probably didn't learn any practical skills that you can directly apply to a science job in industry. In the book [Beginning Cosmetic Chemistry](#) you will find an overview of all the relevant topics to becoming an excellent, well-rounded cosmetic chemist.

In this e-book, the important skill of duplicating the formula of a competitor is outlined. If you find this information helpful, you should consider getting a copy of [Beginning Cosmetic Chemistry](#) for a full treatment of more than 50 other topics essential for cosmetic scientists. Also, be sure to visit [ChemistsCorner.com](#) for tips, discussions, and information important for scientists in the cosmetic industry.

## Why Learning to Knock-off Products is Useful

As a cosmetic scientist, you will be frequently faced with the task of copying or knocking-off a competitor's formula. This is a standard practice in the cosmetic industry for a variety of reasons.

- It's faster
- It's easier to manufacture
- Success in the market provides proof & a feeling of less risk
- Companies are trying to solve the same problems
- It's difficult to create a truly new product from scratch

## Excellent Learning Opportunity

While copying a competitor's formula will not ultimately lead to revolutionary new products, it is an excellent opportunity for a beginning cosmetic scientist to develop her formulating skills. For the seasoned formulator, it is a great chance to hone their formulating skills in areas which they may not have had much experience. Many cosmetic formulators spend their careers getting proficient in one or two formula types. It's extremely difficult to become expert in all product areas.

### Expert Evaluator

Knocking-off a competitor's product gives you a great chance to become an expert at evaluating these types of formulas. To be able to knock-off a formula you have to be able to first know how the product you're trying to emulate performs. For cleansing products you'll have to learn how to test foam. Moisturizing products will require you to learn how to judge skin condition after treatment. For makeup you'll have to test formula "hardness" and ease of application.

### Ingredient Specialist

You'll also quickly learn which ingredients are essential to a formula and which are just "fluff" that support the marketing story. Cosmetic formulas are often filled with ingredients that have limited noticeable effect on the performance of the product. During the process of knocking-off a competitor's formula you'll gain invaluable experience about working with a variety of raw materials.

## 10 Steps to Knocking Off a Competitor's Formula

This book goes through the ten steps you can follow to duplicate nearly any cosmetic or personal care formula you encounter. If you follow these steps you are practically guaranteed to quickly succeed. There is almost no product you can find that can't be copied using these techniques. By the time you've completed step 10, you'll have a product formulation that performs almost identically to the one you copied.

Here is a quick summary of the 10 steps. They are further explained in the subsequent pages.

1. Obtaining samples
2. Becoming an expert user
3. Analyzing the ingredient list
4. Using patents to get you started
5. Generating starting formulas
6. Getting clues from key suppliers
7. Creating and revising prototypes
8. Laboratory testing of prototypes
9. Testing the formula with consumers
10. Finishing touches - matching aesthetics

# Step 1: Obtaining Competitive Product

## Importance of having the product

Perhaps the most important thing you'll need for copying a competitor's product is a sample of the product. This will enable you to figure out the aesthetics, performance and other characteristics needed for judging whether you are successful. The best way to prove that you copied a competitor is to put the formulas side-by-side (in the same package) and see whether someone can tell them apart. Ideally, you'll get multiple samples because there are a number of tests you can conduct to help in your copying efforts.

To get the product, go to your local drug, grocery or department store and buy samples if they have them. Often they'll have multiple holdings of the same product so get as many as you can. If you need more, go to other stores in the area and buy away. Depending on the project, you should get a half to a dozen samples.

## Where to get multiple samples

While getting products from stores is usually the best option, you will sometimes have a hard time finding them. For example, if it is a product produced and sold outside your country you won't find it in local stores. Also, if the product has been discontinued or is popular your area stores may not have it in stock. In these cases you'll need another option. Using the Internet is a great way to quickly get samples.

### Drugstore.com

The first place to look for a product is [Drugstore.com](http://Drugstore.com). They sell a number of popular products from all the top brands. Their website is set up so you can conveniently search by keyword, product type, or even just browse. For premium salon and department store brands you should also check out their companion site called [Beauty.com](http://Beauty.com)

A great feature of these websites is that they list all the ingredient and claims information. This will be useful for later steps when generating prototypes.



## Amazon.com

Many times retailers will use [Amazon.com](http://Amazon.com) as their primary distributor. If you are having trouble finding something be sure to search Amazon. They sell much more than just books. Their beauty product selection is excellent.

## Ulta.com

Much like the previous websites, [Ulta.com](http://Ulta.com) makes it easy to search for different product types and order multiple samples at one time. They carry a number of brands not found on the previous website so to get exactly what you want you may have to search both websites.

## Ebay.com

If you can't find the product on either of those sites you can always try online auction sites like [Ebay.com](http://Ebay.com). There are a number of personal care and cosmetic companies who sell products exclusively through Ebay. This option is particularly good for products that come from outside your country.

## Direct from the website

Another option is to buy product directly from the competitor's website. Almost all major (and minor) brands have a way for you to order and pay right through the website. This isn't the first place you should try because they may not want to send multiple products to your address if they see you are a competitor. One way around this is to have it sent to your home or a PO box.

## If you can't get the product

Sometimes the product you are trying to copy is too expensive to get multiple (or even 1) product. In these cases, try to get small samples which may be available for free or at a reduced cost.

If you absolutely can't get the product, you can proceed but your chance of success will be limited. Of course, the chances that someone would know you didn't succeed are even less.

Even if you can't get a sample of the exact product it is helpful to get something that is similar. Before formulating be sure to get example of other products in the category of the one you are trying to copy.

## Step 2: Becoming and Expert User

### Importance of using the product

To successfully knock-off a product, you have to know the product inside and out. This means you will have to know everything you can about the product and the user's experience with that product.

In subsequent steps you will learn how to analyze the product in the lab. But before you start chemically breaking down a formula and building it back up, you have to figure out what the consumer's experience with the product is. The best way to do this is to USE THE PRODUCT ON YOURSELF! That's so important it should be repeated.

USE THE PRODUCT ON YOURSELF!

Don't be shy. Most cosmetics and personal care products create temporary effects and are easy to wash off. Remember your skin and hair is not much different than the consumers that will be using the product.

### Be an engaged user

Use the product a few times and keep records of your experience. The first time you use it, imagine you are the consumer. Take notice of the way the product is applied. Ask yourself different questions and keep track of your responses. Is it easy? Do you like how it looks or feels? Is there anything different compared to other products? Is it fun?

On subsequent trials, see which things you keep noticing over and over and which things don't seem to matter. If you had another product in the same category try it and see what differences you notice.

Forget about the claims that the product makes and the story used to support it. Most of these statements are marketing stories anyway and don't reflect how the product will perform.

Going through the experience of using the product will allow you to pick up subtle clues about what is important and what is not. You will get information about things like rheology, feel, greasiness, etc.

The more interaction you have with the product the better. If you can use a product exclusively for a week, this is an excellent practice. At the very least, use the product 3 or 4 times just so you know the experience of the consumer. You don't have to continue to use the product once your project is done but while you're trying to knock off a competitor, the more exposure to the product, the better.

## You can't try the product?

If you can't try the product (for example a bald man working on a shampoo) you can still use the product to wash your hand or rub through your scalp just to mimic the experience of the consumer. The more information you can get (even if it is not complete) the better.

Another alternative when you can't try a product is to give it to have your spouse, friend or relative try it and then interview them about their experience. Be sure to prep them with the types of things you want them to notice prior to using the product.

Take notes so you can refer to them later when you try to determine how close your prototypes are to the original.

## Step 3: Analyzing the Ingredient List

### Get the list of ingredients

In the United States, all cosmetic companies are required to put a list of ingredients (LOI) on their products. The first thing you will want to do is copy that LOI and put each ingredient on a separate field in a spreadsheet. This will be where you begin making your preliminary formulas.

### Getting lists on the Internet

If the product you have doesn't have an LOI on the container, see if you can find one on the Internet. There are some excellent resources for this task.

The first place to look is the company's website. Many / most reputable companies have the ingredients listed for all their products. Ideally, they will list them by the approved names found in the International Nomenclature of Cosmetic Ingredients (INCI) published by the Personal Care Products Council. If not, some further investigation will be required from you.

If the company's website doesn't have this information, check websites like Drugstore.com and Ulta.com. These sites provide a nice listing of the ingredients (and the claims) in a handy digital format. You can also do a Google search of "Ingredient list" plus the product name. Sometimes you'll find that a person has typed it out on a public forum.

### Example of an LOI for body wash

INGREDIENTS: WATER (AQUA), SODIUM LAURETH SULFATE, COCAMIDOPROPYL BETAINE, PEG 8, GLYCERIN, DISODIUM LAURETH SULFOSUCCINATE, FRAGRANCE (PARFUM), POLYQUATERNIUM 10, PEG 7 GLYCERYL COCOATE, DMDM HYDANTOIN, IODOPROPYNYL BUTYLCARBAMATE, CITRIC ACID, TETRASODIUM EDTA, RED 33 (CL17200), BLUE 1 (CL42090)

## Putting the ingredients in order

Once you have the ingredient list, enter the information into a spreadsheet program and make note of the number order of the formula.

Here is an example of that body wash ingredient list in spreadsheet form.

Order	Class	Ingredient	Formula %
1		Water (aqua)	
2		Sodium Laureth Sulfate	
3		Cocamidopropyl Betaine	
4		PEG 8	
5		Glycerin	
6		Disodium Laureth Sulfosuccinate	
7		Fragrance (parfum)	
8		Polyquaternium 10	
9		PEG 7 Glyceryl Cocoate	
10		DMDM Hydantoin	
11		Iodopropynyl Butylcarbamate	
12		Citric Acid	
13		Tetrasodium EDTA	
14		Red 33 (CI17200)	
15		Blue 1 (CI42090)	

Next, you should look up all the ingredients in the INCI and figure out the class of ingredient. This will help you in figuring out the formula. With time and experience you will learn what all these ingredients do. The formula above contains various classes of ingredients including

- Solvent
- Primary Surfactant
- Secondary Surfactant
- Conditioning Ingredients
- Preservative
- Adjusting Agents
- Fragrance
- Color

## 1% Rule

If it is a product produced in the United States and they follow standard labeling rules, you'll know that anything above 1% concentration in the formula will be listed in order.

Your next step will be to guess where the 1% line might be. While many of the ingredients below 1% can have a significant impact, the ingredients above this level will provide the bulk of the aesthetic and performance characteristics. By listing the ingredients you will be able to tell the relative formulation levels of the key ingredients.

Order	Class	Ingredient	Formula %
1	Solvent	Water (aqua)	
2	P. Surfactant	Sodium Laureth Sulfate	
3	S. Surfactant	Cocamidopropyl Betaine	
4	S. Surfactant	PEG 8	
5	Conditioning	Glycerin	
6	S. Surfactant	Disodium Laureth Sulfosuccinate	
Likely 1% line – Ingredients below are less than 1%			
7	Fragrance	Fragrance (parfum)	
8	Conditioning	Polyquaternium 10	
9	Conditioning	PEG 7 Glyceryl Cocoate	
10	Preservative	DMDM Hydantoin	
11	Solvent	Iodopropynyl Butylcarbamate	
12	Adjustments	Citric Acid	
13	Adjustments	Tetrasodium EDTA	
14	Color	Red 33 (CI17200)	
15	Color	Blue 1 (CI42090)	

Sometimes a product will list out “active ingredients” and put a specific % for them. This is incredibly useful because you know exactly how much of this ingredient to use. Put this number next to the ingredient on your formula spreadsheet.

Moving forward, the goal of your research efforts will be to figure out the % of all the major ingredients on your ingredient list. We are not so worried about minor ingredients because they usually have minimally perceptible effects.

# Step 4: Using Patents to Get You Started

## Mining patents for clues

Many of the cosmetics and personal care products you'll be asked to copy will have patents related to them. While the exact formula that the company used in making the product won't be listed, their patents will still have example formulas which provide a great starting point for prototypes.

They also provide an excellent source of background information which will help you better understand the role of all the ingredients in the formula. This will help immeasurably in your copying attempts.

Patents will also give supplier names of blends that might have been used. You can talk to your suppliers about the concentration of these blends and get a good idea of how much the ingredients are used in the formula.

## Patents tell you what you can't do

In addition to providing you formulating clues, the patent will also give you direction on the things that you can not do. It will show you which combination of ingredients and at what level you will not be able to ultimately launch.

At this point, do not worry about what you can and can't launch. Your first goal is to get a prototype that closely mimics the competitor's product. After you've created the knockoff, you will be able to make adjustments to the formula to get around the patents.

There are almost no patents of personal care and cosmetic products that can't be worked around.

## Where to find patents

The best source for patents is directly from the [United States Patent Office](#). The full text of every patent since 1976 can be searched.



## Step 5: Generating Starting Formulas

### Analyze the formula

Before you start making prototypes you'll want to analyze the formula you are trying to copy. If you have access to an analytical lab, that is great. Send it out to them and have them analyze the sample for anything that may help. For example, if water is the first ingredient you can have the lab test the percent solids. This will tell you exactly how much water is in the formula. Often this is 80-90% of the formula.

Other ingredients can be determined with standard tests too like surfactant level, silicone concentration, and protein concentration can be determined using instruments like the GC, IR and Mass Spectrophotometer. You can investigate the literature to find what can and cannot be measured.

At this point you will also want to take measurements of the pH and viscosity so you know what your target specifications will be.

### Starting formulas

Once you have your ingredient list, have investigated the patent literature, and have analyzed the formula using lab tests, you are ready to write out some potential starting formulas.

If the patent work didn't reveal any helpful information and you are unfamiliar with the formula category, look at the way other similar products are formulated. A great way to do this is to look through free, online formularies of suppliers, magazines, and other sources. Chemidex.com provides a listing of thousands of different types of formulas. Also, most chemical suppliers have formularies on their websites.

These formulas typically have a listing of the class of the ingredient that is used. Since you already know what ingredient types are in your formula, you'll be able to get a good guess for the levels of all the different types of ingredients used.

The most important ingredient classes will be things like the following

- Primary surfactant
- Secondary surfactant
- Conditioning ingredient
- Thickener
- Emulsifier
- Solvent

At this moment, you don't have to worry about things like color, fragrance, adjustment and "feature" ingredients. Later you will add these to complete the knock-off.

When you are putting together your starting formulas, create half-dozen formulas using different levels of the key ingredients. Be sure to vary only one ingredient at a time so you can see what effect the ingredient has on the product. \*Here is one example.

Order	Class	Ingredient	Formula %
1	Solvent	Water (aqua)	88.5%
2	P. Surfactant	Sodium Laureth Sulfate	5.0%
3	S. Surfactant	Cocamidopropyl Betaine	3.0%
4	S. Surfactant	PEG 8	1.5%
5	Conditioning	Glycerin	1.0%
6	S. Surfactant	Disodium Laureth Sulfosuccinate	1.0%

\*You'll also want to include a preservative like 0.2% DMDM Hydantoin.

A more sophisticated way to create prototypes is to follow a Design of Experiment (DOE) protocol. This topic is more advanced than necessary for our purposes but you can look to standard reference texts on the subject for more information. DOE is not something that is yet standard practice in cosmetic formulating.

# Step 6: Getting Clues from Key Suppliers

## What to get from suppliers

While you come up with your potential starting formulas, check with your trusted suppliers to see if they might provide you clues as to what the formula could look like. For cleansing formulas your primary surfactant suppliers could give you suggestions on specific ranges to try. They may even reveal that the makers of the product you're trying to mimic use one of their surfactant blends. Blends are raw material mixtures that companies use to reduce the number of ingredients/steps required to manufacture a product.

At the very least, suppliers can give you access to their formularies that you may not have been able to get online.

## Check with distributors

If you work for a small company you may not be able to meet with sales representatives from all the large sized suppliers. You will have to find a chemical distributor but they can also help the same way as if you were speaking directly to the supplier.

## Resources

To find relevant suppliers for the different ingredients in the formulas go online and search the annual buyer's guide of the [Personal Care Products Council](#). Also, you can find even more information through the buyer's guide of magazines like [Happi](#) and [GCI](#). You can find listing for all the companies in the industry that want to supply you with all the ingredients you'll need.

# Step 7: Creating and Revising Prototypes

## Starting out

After you've generated half-dozen possible prototypes, create your batch sheets complete with raw material order, levels, and target specifications. Then get the raw materials, lab batching equipment like beakers & mixers, and start making the product. Since you won't know exactly what order to put things, it's best to find an example formula that has similar ingredients and adapt the procedure to your formula.

## General tips

Here are a few general guidelines that might be helpful.

- Make batches of at least 400 g. This will help prevent over mixing/aeration but still minimize extra waste.
- Start your batch with the ingredient that is most abundant. This means that in products where water is the primary ingredient, you start your batch by filling up a beaker with water. Put your mixer on a moderate speed and make a note of the temperature.
- Formulas that contain waxes will have to be heated up to a temperature above the melting point of the wax (~85 C or more)
- The oil and water components of an emulsion will typically need to be mixed in separate containers and blended when they reach their high temperature.
- Add preservatives and feature ingredients at the end
- Use a water bath to control the batch temperature
- Be sure to cover the batch with plastic wrap or aluminum foil to prevent water evaporation

## Be observant

Make special note of things that change in the formula during mixing. Also, be sure to time how long ingredients take to fully mix into the batch. This will be helpful for revising your procedures and eventually for making the product in your production tanks.

## Finishing a batch

When you are done with your batch and you've let it equilibrate to room temperature, take readings for the pH and viscosity and compare how close you are to the target product.

## Making adjustments

For the pH, you can try adding acid or base to increase or decrease it. If the viscosity is off you can try adding salt (NaCl) to adjust it.

However, often these tricks won't work or won't be appropriate for the product you are trying to copy. In these cases, you'll have to adjust the ingredient levels on your batch sheet and try something new.

## Second generation prototypes

When making ingredient adjustments to your next generation of prototypes focus on changing only one ingredient per batch. This allows you to figure out just what effect each ingredient has on the final characteristics of the formula.

For example.

Order	Class	Ingredient	Formula %
1	Solvent	Water (aqua)	86.5%
2	P. Surfactant	Sodium Laureth Sulfate	5.0%
3	S. Surfactant	Cocamidopropyl Betaine	5.0%

4	S. Surfactant	PEG 8	1.5%
5	Conditioning	Glycerin	1.0%
6	S. Surfactant	Disodium Laureth Sulfosuccinate	1.0%

Note in this formula, the water level was also adjusted. When you make adjustments to any ingredient usually you make up the difference with the ingredient that constitutes the bulk of the formula. In most cases, this will be water.

After 6 to 12 attempts, you should end up with a formula that is close enough to the target formula that you can go ahead and do some further testing.

## Step 8: Laboratory testing of prototypes

### Try it out

The first type of testing you'll want to do is to use the product on yourself. Since you have experience with the target product you will know how close you are to matching it. No test will be more revealing as to whether you've copied the product than when you test it on yourself. Be sure to make note of any differences you experience.

To further convince yourself and others that you've been successful, there are other types of tests you can run. These will vary depending on the specific formula you are trying to mimic.

### Specialized lab tests

For skin lotions you can compare the performance using instruments like Novameter, Cutometer, Twistimeter, or dequamation discs.

For hair products you can test them on tresses, in a salon, or use instruments like the Instron or Diastron.

You can also measure a wide array of other types of formula performance characteristics like foam height, formula texture, conditioning effect, color, etc. The specifics depend on the type of product you are trying to knock off. Consult a book like [Beginning Cosmetic Chemistry](#) for more specific testing examples.

These performance tests should give you information on how you need to adjust your prototype to get closer and closer to the target product.

### Revise and remake prototypes

After you've collected your data, adjust your formulas and make new ones for testing. With enough adjusting and testing, you will end up with a prototype that matches the original formula in both ingredients and appearance.

Before moving to the next step however, you should do a quick stability check to see if your prototype is stable. If you have enough of the target product, you can put it up on a stability test to see how well it performs. However, if you don't have enough you should just assume that the target is stable and see whether yours is or not. If it is not stable you'll have to make some formulation adjustments and try again. The topic of stability testing is covered extensively in the book [Beginning Cosmetic Chemistry](#).



## Step 9: Matching Product Aesthetics

### Making the products look & smell the same

After you've gotten the formula performance down, you'll need to try and match the aesthetics like color and fragrance. Often this is not required because your marketing department or customer doesn't actually want an exact match, but sometimes they do.

### Color matching

To match the color you can start with 1% (or 0.1%) water solutions of the colors that are listed on the ingredient list. Start with some of the base formula and mix in a measured amount of color. The starting levels are really up to your judgment. They do not matter too much as you will be adjusting up or down to get the right color. The important part is to record how much of any color you've used.

After you've mixed it, compare it to the control and determine whether it is too dark or too light. In your next attempt double the amount of color or cut it in half so you can compare what effect that has on the resulting color. Continue this process of doubling or halving dye levels until you get something that matches. If done properly, you should get pretty close in 7 tries.

### Make a new batch

Once the post color addition is ready, make a batch from start to finish with those dye levels. You'll likely find that they do not match exactly and you'll have to make slight adjustments until you get it right. Adding a color at the end will not always give a true representation of what the color will look like in production. That is why you do this final step.

### Making them smell the same

Matching the fragrance is a bit more challenging. The best option is to talk to a trusted fragrance supplier and ask them for a sample of fragrance that duplicates the target product. These types of projects are the kinds of

things that fragrance houses do on a regular basis, so you should have no problem getting what you need.

If there isn't time or you can't get a fragrance supplier to work with you, just use a fragrance that is in the same family as the target product. Sometimes smelling close to the same is adequate for this phase of development.

# Step 10: Testing the formula with Consumers

## Try it out on people

Now that you've gotten the formula copied, it's time to prove it with a small consumer testing panel. If you are an independent chemist or you work for a small company you may not have access to trained consumer panels. In this case, just make a dozen samples and hand them out to coworkers, friends and family to get their reactions. Ideally, you'll give them a sample of the original and the knock-off and ask them to tell you what differences they experience.

If your small consumer panel can't tell any significant differences, you can have confidence that the larger consumer market won't be able to tell either.

## Putting it in Packaging

For these types of tests it is helpful to put the prototype and target product in similar packaging. This eliminates the tendency for your prototype to be judged harshly because of the container rather than the formula itself.

You can get samples of stock packaging from your package suppliers or directly online from companies like [ebottles.com](http://ebottles.com)

## Next Steps...

Once you've made it through these 10 steps you should have a formula that is an extremely close match to that of a competitor's. You'll have something you can give to your marketing partner (or boss) that they will be able to use for launching a new product. Additionally, you will have gained a vast amount of knowledge about the performance of the formula type and the different kinds of ingredients that you will use.

This is an excellent exercise to hone your formulating skills.

It's not recommended that you focus your career on knocking off competitive formulas. This exercise is only meant to be a starting point. Whether your marketing department knows it or not, products that are merely copies of existing products are not innovative and are doomed to have a difficult time getting market share. Who wants to listen to a cover band when they can easily get the real thing?

### Be Creative

Be creative. While you may get lots of projects similar to the one outlined here, these will not lead you to become an innovative cosmetic chemist. Instead use your skills to make your own formulas. Experiment and try different ingredients at crazy levels. That's what innovative cosmetic chemists do. That's where you'll find breakthrough formulas.

## More Cosmetic Chemistry

Would you like more information about all you need to know to become a successful cosmetic chemist? You can find it in the latest edition of [Beginning Cosmetic Chemistry](#) published by Allured. It's available through their website or trusted online booksellers like Amazon.com.

And if you want to continue to learn more about formulating cosmetic products make certain you visit

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