



– amixon® whitepaper –

Ingredient Transparency and the Clean New Face of the Beauty Industry

amixon® mixers and manufacturing clean cosmetics

The central role of hygienic mixing equipment in the manufacture of
clean cosmetics



INTRODUCTION

The new face of cosmetics manufacturing

Beauty standards have always changed with the times. In turn, beauty products and the manufacturing practices that bring them to market must adapt to each new generation of demands.

The market for cosmetics, skincare, and hygiene products is highly saturated and toughly competitive. Despite this, and despite the COVID-19 pandemic, the industry for beauty products is projected to increase in value by more than \$38 billion USD between 2020 and 2024.ⁱ Much of this growth will be fueled by niche and previously underserved demographics, as well as a rising demand for evidence-based beauty products made from natural and non-toxic ingredients.

As beauty marketing pivots to a message of ingredient transparency, renewed attention is being paid to hygiene in cosmetics manufacturing. The pressure is on to create innovative product formulations and manufacturing practices that can adequately address evolving consumer demands and regulatory shifts that call for greater clarity about the ingredients used in cosmetic and skincare products.

This whitepaper from amixon GmbH aims to provide insights into the hygiene and product quality challenges faced by manufacturers in a new generation of skincare and cosmetics. Rising demand for ingredient transparency and natural products paired with increasingly strenuous regulatory standards call upon cosmetics manufacturers to take extra measures to prevent contamination and ensure product quality and consistency. Especially for cosmetic products composed largely of dry, powdery ingredients, hygienic mixing equipment plays a crucial role in achieving success in this new era of beauty.



ABOUT AMIXON

Industrial mixing technology made in Germany

For nearly 40 years, amixon® has been a market leader in the manufacture of sophisticated, high-precision mixing equipment for diverse processing needs. Made in Germany from food grade materials, outfitted with hygienically optimized proprietary technology, and customized to the exact specifications of your products, amixon® mixers offer state-of-the-art bulk material processing solutions for manufacturers of cosmetics, hygiene, and personal care products.



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amixon® Vertical Twin-Shaft Mixer HM



Which consumer trends are fueling the rise of ingredient transparency?



Which regulatory changes regarding ingredient transparency are on the horizon?



What challenges does ingredient transparency pose to cosmetics manufacturers?



What role do industrial mixers play in helping to ensure product quality and safety in cosmetics manufacturing?





Clean Beauty and consumer demand for ingredient transparency

For decades, consumers were happy to think of beauty products as something of a secret – a mysterious brew that could magically enhance their attractiveness and self-confidence.

Today, growing consumer consciousness regarding health and the environment as well as demographic shifts have radically changed the beauty industry. Modern consumers are increasingly concerned about the ingredients used in their makeup, skincare, and hygiene products and are prepared to research many aspects of a product prior to buying: from which ingredients are used, to where they are sourced, to how they are processed, to what they actually contribute to the product.

The buying behavior of such informed consumers has been linked to the rise of Clean Beauty. In a 2020 survey of 24,000 women worldwide, as many as 93% reported they were more inclined to buy beauty products labeled as “clean.”ⁱⁱⁱ This massive consumer-driven movement has led market experts to project that the Clean Beauty market will grow at a rate of 9.4% annually between now and 2026,^{iv} more than twice the rate of the overall global cosmetics and skincare market.^v

But what exactly does “clean” mean? As a diffuse trend with several overlapping but not identical definitions, products in the Clean Beauty category generally claim several of the following markers: non-toxic, environmentally friendly, all-natural, organic, cruelty-free, and vegan.

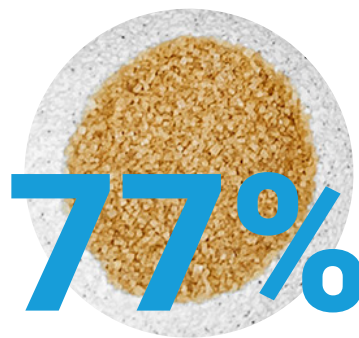
Consumers from different demographics cite different motivations for putting their purchasing power behind the Clean Beauty movement. Here are some of the major consumer-driven trends propelling the tremendous growth of Clean Beauty and ingredient transparency:

69% of women worldwide wish there was more transparency around beauty products, agreeing that brands don't provide sufficient information about the ingredients in their products.ⁱⁱ

1.1 Health

The main driver of the Clean Beauty movement is consumer concern about harmful chemicals. Across the world, Clean Beauty shoppers name their own health as a primary motivation for purchasing products labeled as “clean,” “non-toxic,” or “preservative free.”

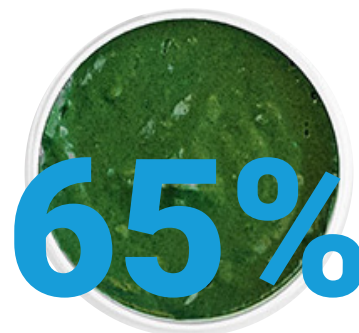
The so-called “Dirty Dozen” of skincare and cosmetic ingredients, including parabens, formaldehydes, petroleum byproducts, and sulfates, have quickly become no-gos for savvy Clean Beauty shoppers. Evidence is mounting that these ingredients can not only cause skin irritation, but are also linked with cancer, birth defects, and infertility. A 2010 study of the beauty products in Canadian homes found 80% of these products contained at least one of the 12 most notorious ingredients.^{ix}



of Germans who purchase Clean Beauty products say they do so to avoid harmful ingredients.^{vi}



of U.S. consumers of Clean Beauty products say they believe these products are better for their health.^{vii}



of APAC consumers consider their health and wellbeing when buying beauty products.^{viii}

1.2 Environment & ethics

Growing awareness about climate change and animal welfare has contributed to many shoppers thinking twice about the greater impact of their purchases. A significant portion of Clean Beauty shoppers are not only concerned with how beauty products may affect their health, but also that of the planet. A 2018 market analysis named the natural and organic personal care sector as the fastest growing subcategory in the Clean Beauty market, projecting it to nearly double in value from \$12.9 billion in 2017 to over \$25 billion by 2025.^x

From food to fashion to beauty, consumers the world-over are increasingly favoring plant-based ingredients. Many popular food items such as beet, oats, turmeric, ginseng, and coconut oil are also prized by consumers in their beauty products. Especially compared to synthetic ingredients, plant-based formulations are strongly associated with eco-friendly and cruelty-free production processes.

When shopping for beauty products, consumers motivated by environmental and ethical concerns are likely to take more than just ingredients into consideration. Especially among millennial and Gen-Z shoppers, single-use plastic packaging is increasingly becoming an immediate disqualifier.^{xii} For many indie Clean Beauty brands, minimal, refillable, and recycled packaging is a crucial part of their value proposition.

A survey of 1,800 UK based consumers found that 60% of respondents would like for brands to identify how their ingredients are sourced.^{xi}





1.3 Product effectiveness

Especially in the high-end skincare sector, a central question is whether or not these often expensive products actually deliver on their promises. A recent uptick in “Beautech” companies offering tele-dermatology, personalized product recommendations curated by AI, and skin progress tracking regimens point to an important demand in the beauty industry. Consumers are increasingly asking themselves which ingredients are best suited to address their individual skin gripes and goals.

For many consumers, participation in the Clean Beauty movement is motivated in large part by transparent labels that make it easier to find products with the ingredients they believe will work for them. Consumers of this persuasion may be less concerned with buying “all natural” products as they are with buying “evidence-based” ones. This branch of Clean Beauty is fueling the promising but still nascent market for crossovers between beauty, biotech, and digital devices.^{xiv}

A survey of 1,800 UK based consumers found that 72% of respondents would like for brands to explain what the ingredients in beauty products actually do.^{xiii}

1.4 Religion

Muslim women make up roughly an eighth of the world population, and Islam represents the fastest growing religious demographic worldwide. Yet the global beauty industry has been slow to offer products explicitly formulated and produced in accordance with Sharia law.

As more beauty manufacturers recognize the opportunity in this historically underserved demographic, the halal beauty market has seen tremendous growth. With a projected annual growth rate of 12.3% through 2025, halal beauty is growing nearly three times as fast as the global beauty industry overall.^{xv}

Clean Beauty and increasing ingredient transparency are beneficial developments for devout Muslim consumers looking to purchase beauty products in accordance with their faith. Because the bulk of ingredients forbidden by Sharia law are animal-derived, many Muslim women will look for vegan-labelled beauty products in the absence of explicit halal certification. However, alcohol may still be present in vegan products, and while not all forms of alcohol are haram in cosmetic applications, “alcohol-free” labels are generally well-received among this demographic.^{xvi}

2

Regulatory shifts towards ingredient transparency

The global rise in consumer demand for ingredient transparency in the beauty industry is paralleled by increasing regulatory scrutiny. As political institutions, cosmetics and skincare brands, and third-party certifying organizations begin to rally around the cause of heightened ingredient transparency, a number of upcoming regulatory changes and standardization practices are poised to transform the business of beauty.



2.1 Expanding legal oversight of ingredients

Up to this point, the US market has essentially been the wild west of cosmetics, skincare, and hygiene products. Federal oversight over these products is notoriously limited and has not been subject to any meaningful changes since the Federal Food, Drug, and Cosmetic Act was institutionalized 1938. As of yet, the FDA has only banned about 30 chemicals from use in beauty products, while the European Union has banned over 1,300.^{xvii} Furthermore, the FDA currently has no authority to issue a recall of cosmetic products found to be contaminated or otherwise unsafe, leaving corporations to voluntarily self-regulate in this regard.^{xviii}

But this ingredient free-for-all has an expiration date. Since 2018, several pieces of legislation, including the senate's "Modernization of Cosmetics Regulation Act" and California's "Toxic-Free Cosmetics Act," have been introduced on the state and federal levels with the goal of increasing regulatory authority over the beauty industry and expanding the list of banned ingredients.^{xix} Once enacted, these mandates will force manufacturers making cosmetics and skincare products for the US market to comply with established good manufacturing practices. Compliance with GMPs equally emphasizes in-process and end-of-line quality control, and would bring the American cosmetics industry in line with European and other major international standards.^{xx}

Though the US. may be the most dramatic example of upcoming change, it is far from the only country where the laws governing ingredients in beauty products are undergoing an evolution. Many other countries are also seeing stricter safety regulations and ongoing discussions of the permissibility of certain ingredients in beauty products.

Following Brexit, the UK is in the process of deciding how cosmetics will be regulated, while vocal critics urge the importance adopting regulations more similar to those of the EU than the US.^{xxi} Indonesia currently taking steps to transition all cosmetic products to halal certification by 2026, and Malaysia is working to introduce similar legislation. Following Korea's example, other east Asian countries are looking to develop their own chemical management legislation after the model of European REACH initiatives.^{xxii}



2.2 Clarifying claims and voluntary disclosure

Clear and standardized use of terminology is a cornerstone of transparency. Especially given the diffuseness of the term “clean” as a descriptor for beauty products, the lack of standardized terminology can give rise to greenwashing and misleading health claims.

In many major markets, terms like “organic” and “natural” are not subject to any sort of regulation when used to describe cosmetics, skincare, or hygiene products. Furthermore, while a beauty product may tout itself as free of ingredients that are proven to be toxic, it may still contain other ingredients for which there is simply no data to verify their safety.

Despite a lack of regulation, some companies are voluntarily taking the initiative to use clearer language on their own products. For example, because there are no standards for what percentage of ingredients used in an “organic” beauty product must be certifiably organic, many small brands in the Clean Beauty space will avoid referring to the product as such, preferring to lead with phrasing like “made with certified-organic coconut oil.”

But it isn’t just small brands that are opting for more transparent ingredient labeling. Multinational corporations like Unilever and Johnson & Johnson have in recent years chosen to list all of the fragrance components in their beauty and personal care products rather than using the term “fragrance” as a catch-all.^{xxiv}

We may be a ways away from universally consistent language in the beauty industry, but companies large and small have a vested interest in announcing their own standards and keeping the competition honest. As more beauty brands begin to lead by example with transparent claims, legislation regulating the language used on beauty products may follow.

2.3 Rise in third-party certifications

Concerned consumers who are fatigued from navigating ingredient labels in the beauty industry are increasingly putting their trust in stamps of approval from third-party auditors. Where legal regulation of terminology is lacking, certifying bodies that audit production processes and verify product claims are a quick and reliable way for consumers to identify products that meet their standards.

Investing in certification from organizations that independently verify product claims can help beauty businesses stand out from a sea of competitors making unsubstantiated claims of cleanliness. And in an industry undergoing serious regulatory change, certifications can help beauty product manufacturers to address potential issues in their processes before they are legally compelled to do so.

In a 2019 survey of global cosmetic brands, 49% listed the proactive substantiation of product claims among the top three priorities and challenges for their business.^{xxiii}

3

Cosmetics manufacturing challenges and the role of dry ingredient mixers

There is no question that ingredient transparency is the present and future of the cosmetics, skincare, and personal hygiene industry. But there are a number of manufacturing challenges involved in producing effective, profitable cosmetics that meet varying definitions of “clean” while proactively taking steps to address changing regulations and standards.

High-performance mixers are pivotal pieces of equipment in the production and development of safe and effective cosmetics, skincare, and hygiene products. Especially for cosmetic products composed largely of loose or pressed powders, mixing is among the most decisive steps in the entire production process in terms of its impact on the resulting product quality and safety.

This chapter outlines two of the major challenges that heightened expectations for ingredient transparency pose for cosmetics manufacturers: preventing microbial contamination and ensuring product consistency while remaining agile. In addition, it explores how amixon® mixers can help manufacturers of powder-based cosmetics ensure quality and safety in a market defined by increasing pressure from regulators and consumers.

Mixing is among the most decisive steps in the entire production process in terms of its impact on the resulting product quality and safety, especially for cosmetic products composed largely of loose or pressed powders.

3.1 Preventing microbial contamination

The persuasive power of “preservative-free” and “alcohol-free” product labels leaves cosmetic manufacturers in something of a bind. Though consumers may be rightfully wary of preservatives of the Dirty Dozen variety, non-toxic preservatives have an important function in keeping consumers safe from microbial contamination. After all, bacterial contamination was the reason for 76% of all cosmetic and personal care products recalled from the US market from 2002 to 2016.^{xxv}

Compared with liquid, serum, and cream-based products, cosmetics consisting mostly of dry ingredients, such as blush, eyeshadow, and face powders, are less prone to microbial contamination and are therefore better suited for preservative-free formulation. But extreme hygienic diligence during manufacturing is necessary to ensure that preservative-free cosmetic powders do not harbor microbial contaminants.

As the vessel in which all ingredients come together, mixers play an important role in creating contaminant-free cosmetic powders. In particular, amixon® mixers are designed for optimal hygiene and include a number of features that can facilitate obtaining third-party certifications:



No accumulation of residue

all amixon® mixing vessels and blades are made from food grade stainless steel with a smooth, sanitary finish to minimize the build-up of material residues. The mixing shaft is driven and mounted only from the top, out of contact with the mixing goods. The inspection doors are produced using the CleverCut® method, during which an O-ring is inserted into the groove, creating a gastight, dust-free seal that is both close to the product and free of deadspace.



Innovative technology for complete discharging

amixon® mixers with conical floors can quickly discharge flowable bulk materials without segregation. But ComDisc® technology makes it possible to achieve up to 99.997% discharge even in flat-bottomed mixers. Installed at the bottom of the mixing shaft, this flexible mechanism floats through the product during the mixing process and lowers to the vessel floor upon discharging. There, it sweeps the bottom of the mixer in a radial fashion, pushing the mixing goods towards the discharge outlet. The result is less product loss and a cleaner mixer interior.



amixon® Conical Vertical Dryer AMT



Automated WaterDragon® wet-cleaning and drying mechanism

A series of retractable washer nozzles are installed at strategic points within the mixing vessel. After discharging, the nozzles automatically protract from behind their air-tight closure flap. Driven by the pressure from the wash water, the washing heads rotate to spray down the interior of the mixing vessel. The system is designed to automatically drain itself of residual rinse water before funneling warm air into the vessel via the nozzles to completely dry the mixer.



Thermo-pneumatic sterilization

Especially when developing cosmetics from plant-based ingredients and other organic materials, it is crucial to eliminate naturally occurring microorganisms to create a shelf-stable product. 3-in-1 mixers, reactors, and vacuum dryers from amixon® can be used to sterilize organic powders while only subjecting the ingredients to minimal thermal stress. The resulting mixture is perfectly dry and homogenous with a dramatically lowered microbial count.

3.2 Ensuring product quality and consistency under accelerated production conditions

Even before the Clean Beauty movement amplified demand for ingredient transparency, cosmetics such as eye shadows, blush, and face powders were held to high standards: they must provide even and long-lasting coverage, be easy to apply and adequately pigmented, and must not crumble, cake, or clump.

Due to great variability in the way that different powders behave, uniformly mixing, extruding, and pressing high quality powdered cosmetics is challenging in and of itself. But in a market where consumer demand for or aversion to particular ingredients can evolve overnight, cosmetics manufacturers are under increasing pressure to develop, test, and bring new formulations and colors to market at an accelerated pace.

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When new or improved cosmetic formulas featuring clean ingredients are developed in labs, a key challenge lies in scaling the volume for the manufacturing floor while keeping the number of processing steps and machine changeovers as low as possible.^{xxvi} And in adjusting existing formulas to replace certain ingredients or modify the colors, even slight tweaks can be tricky to get right without adversely affecting product quality.

Quickly bringing new and improved cosmetics to market demands that manufacturers have flexible processing equipment. amixon® mixers are able to accommodate highly variable materials and production conditions, increasing the agility with which manufacturers can launch new formulas:



Wide range of processing functions

Many amixon® mixer models can perform a range of different tasks, such as drying, reacting, sterilizing, coating, homogenizing, dispersing, conditioning, deagglomerating, and agglomerating. This allows for multi-step formulations to be processed in a single piece of equipment.



Precisely adjustable settings

From residence time to mixing velocity to atmospheric pressure, just about every aspect of the mixing process can be calibrated according to the exact requirements of the task at hand. For this reason, amixon® mixer models can accommodate materials with highly variable characteristics, from fine powders that tend to clump, to delicate light-reflecting components, to oily or waxy binding agents.



Variable filling levels

amixon® mixers can achieve uniformly excellent mixing results at filling levels as low as 10 percent, giving cosmetics manufacturers the flexibility to produce different volumes of different products using the same mixing equipment.



Gentle processing with consistent results

amixon® mixers produce technically ideal mixing qualities in as few as 20 to 90 revolutions by means of an innovative spiral mixing tool with a slight incline of 30°. The tilted helical blades gather powdery contents at the periphery of the vessel and convey them upwards. Once the powders have reached the top, they flow back down along the mixing shafts, generating a three-dimensional current. This deadspace-free mixing operation is especially gentle and energy efficient.



amixon® Vertical Twin-Shaft Mixer HM

4

Conclusions

Consumer demand for Clean Beauty is fueling an industry-wide sea change in the direction of stricter regulations, clearer labels, and evidence-based claims. As regulations on product claims tighten and the list of banned ingredients grows longer, the beauty industry will have to pursue additional means of preventing contamination and ensuring product quality.

Ingredient transparency initiatives offer manufacturers of cosmetics and skincare a unique opportunity to showcase their expertise. Through innovative product formulations and agile processing equipment, beauty brands are continually raising the bar in an effort to address evolving consumer concerns around health, ethics, product effectiveness, and faith.

Especially for beauty products composed of powdered ingredients, industrial mixing equipment has an increasingly important role to play in ensuring product safety and consistency. With unparalleled performance, hygiene, and flexibility, amixon® mixers are poised to help cosmetics manufacturers achieve success in new, cleaner, and more transparent era of beauty.

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