

Personalized cosmetic products. News and perspectives.

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Abstract. In a competitive and stressful world that demands vitality, energy and good health, cosmetics play an increasingly important role for individuals and society as a whole.

In this context, customization is a prominent strategy in the beauty industry that can satisfy varied customer preferences. Today's personalized cosmetics can be defined as three major types: (a) previously made by manufacturers according to customer needs (made-to-order services), (b) do-it-yourself (DIY) kits provided for the manufacture of cosmetics by customers themselves at home or (c) performed on site (*in situ*) by sellers or customers.

Most personalized cosmetics belong to type *a* or *b*, where safety and quality are previously ensured by the manufacturers. These are considered general commercial cosmetics; therefore, the final products should comply with regulations such as the Cosmetic Act of the Republic of Korea, and EC Cosmetic Regulation 1123/2009 in Europe (European Commission, 2009). Meeting legal regulations for customized cosmetic products can be a challenge, but compliance is achievable in most situations, especially by the Korean Country market through the Cosmetic Act update. The South Korean Ministry of Drug and Safety (MFDS), in March 2020, introduced the world's first regulatory guidelines on custom (personalized) cosmetics.

Also, in april 2023, Shanghai issued its first license for on-the-spot on site (*in situ*) personalized cosmetics service, marking the launch of a pilot program for such a service in the city.

In the European Union, from this perspective, a customized cosmetic product on the market (online purchase with production at regular facilities; mixing *in situ*; mixing with a household device; mixing boosters with a cosmetic base), does not ensure total compliance with the regulations in the field.

A new, updated guide harmonizing the regulations for personalized cosmetic products should enable best practices for the single market, ensuring their quality and safety.

Keywords: personalized cosmetics, regulation, harmonization giudelines

1. Introduction

Cosmetics play an essential role in everyone's life, every day, 450 million Europeans use a variety of cosmetics such as soap, shampoo, conditioner, deodorant, toothpaste, shaving cream, skin care, cleansing, perfume, make-up, etc. In a competitive and stressful world that demands vitality, energy and good health, cosmetics have an increasingly important role for individuals and society as a whole.

Cosmetics are evolving with society and in recent years, the pace of these changes (products, formulations, ingredient use, packaging, manufacturing and marketing) has increased rapidly.

Some changes have been driven by competition, globalization, and government regulations, but cultural changes in society also play an important role in the "evolution" of cosmetics. In this context, personalization is a prominent strategy in the beauty industry that can cater to varied customer preferences (11).

Consumer demands for personalized products continue to grow because each individual has a unique look and different characteristics, and cosmetics must provide consumers with benefits that fit their needs (8, 9).

Consequently, personalized cosmetics such as consumer-friendly skin care products, makeup products have gained popularity and are widely sold in Europe, USA, Canada, Australia, New Zealand, Republic of Korea, etc. (8, 9, 11, 12).

2. Regulations. Recommendations

Based on market research, current customized cosmetics can be defined as three major types: (a) previously made by manufacturers according to customer needs (custom-made services), (b) *do-it-yourself* (DIY) kit supplied for the manufacture of cosmetics by customers themselves at home, or (c) made on-site (*in situ*) by sellers or customers (5, 6, 12).

Most personalized cosmetics belong to type *a* or *b*, to which safety and quality are previously ensured by manufacturers. These are considered general commercial cosmetics; therefore, final products should comply with regulations such as the Cosmetics Act of the Republic of Korea, the US Federal Law on Food, Medicines and Cosmetics and the EC Regulation on Cosmetic Products 1123/2009 in Europe (European Commission, 2009) (3, 4, 6, 12).

Within the European Union, with the advent of high-tech devices, artificial intelligence, machine learning capabilities, and 3D technology, the way beauty is approached is transforming. Many companies are developing more and more algorithms for assessing the overall appearance and needs of consumers. These algorithms are able to propose the right products for certain skin types and have the role of personalizing the experience, from the category of personalized cosmetics type *a* and *b*.

In this regard, a patented customized solution without preservatives has been developed, which acts at body temperature capable of creating freshly mixed products. This customized solution contains three moisturizing bases, five concentrates and a tool for skin analysis.

After using the tool to establish a personalized care protocol, users can use the recommended skin capsules, mix fresh skin care solutions in just 90 seconds, and use the skin diagnostic tool to determine any changes in their requests (1, 2).

A noninvasive kit has been designed to collect the user's DNA from the skin, a source other than saliva, to determine whether or not a skin care product provides the desired results. It uses an at-home test to develop epigenetic profiles and skin care recommendations to establish: skin aging, regaining elasticity, lack of hydration and hyperpigmentation. In this way, users will be able to monitor their data using a platform, secured to preserve privacy (1, 2).

Do-it-yourself kits mix the contents of several cartridges containing a base cream and cosmetic active ingredients in optimal proportion for the user, depending on skin characteristics. The final formula is designed before the device and cartridges are sent, the user receives a cosmetic kit.

Companies have developed numerous applications that can establish personalized skin diagnosis (pore size and appearance, size and depth of fine lines and skin moisture level), synchronize data and provide personalized recommendations for each skin area through a camera equipped with a magnifying camera that snaps into place at the top of the phone to scan, and a connection with a dermatologist who will help and guide them in setting personalized goals (1, 2, 4, 10).

Also, 3D or micro 3D technology makes face masks, personalized both in shape and ingredients, applied to different facial areas (forehead, eye area, cheeks, nose, folds and chin). After choosing each desired ingredient, color-coded, it will be possible to preview the mask, and it can be ordered from the application.

The above examples fall into the category of personalized cosmetics type *a* and *b*, marketed in the European Union, where safety and quality are previously ensured by manufacturers. This implies that personalized cosmetics type *a* and *b* are made in classic production units, the user fills out an online questionnaire choosing his preferred properties; The product is then manufactured and shipped to your home (3 - 5).

Another very popular method for obtaining custom cosmetics is in retail stores that offer the ability to mix cosmetic ingredients *in situ* at the point of purchase.

In the case of customized cosmetics *obtained in situ*, the exact composition of the product is extremely important, which is not known in advance due to the intrinsic nature of the product. In terms of product quality and safety assurance, it is necessary to regulate the aspects of production space, qualification of personnel, calibration and standardization of the administration device (3 - 5).

It is difficult to predict interactions between cosmetic ingredients, the microbiological quality of the product, alternatively, an IT tool can be used to assess safety *in situ*, but there are some limitations, *e.g.* the time needed to complete the assessment and the need for a responsible person.

For type *a* and *type b* personalized cosmetics some of these aspects are surmounted by the manufacturer's compliance with these regulations, *e.g.* the mixing and use device is automated, the consumer receives precise instructions for use to ensure that the manufacturing process results in a safe cosmetic product (3 - 5, 11).

A particular case is represented by cosmetic active ingredients or *boosters*, which should have their own safety assessment (as they represent individual products) before being placed on the market, but further evaluation is required for the product resulting from the combination of an ordinary cosmetic product (which we can call "base"). When the base and *booster* are manufactured by the same firm, the properties of the resulting combination can be anticipated, and the safety assessment can be carried out in advance, but if the base is manufactured by another firm, such an approach is limited.

As regards safety assessment, a notification, via the Cosmetic Notification Portal (CPNP), must be submitted before placing the cosmetic product on the market. The notification follows the procedures for products purchased *online* and for products prepared in the retail store, if all possible combinations of cosmetic ingredients are known in advance. For products blended at home, if they are assimilated to a *kit*, notification is achievable in advance (3 - 5, 11).

Regarding the labelling of personalized cosmetic products, for products mixed *in situ*, labelling must be done *in situ*, which means assigning a batch number, an expiry date and personalizing instructions for use and warning if necessary, at the time of purchase, ingredients must also be listed correctly, according to the composition of the product.

For products mixed with a household device and for products resulting from mixing the *booster* with a base cream, no labelling of the finished product is required, as they are

produced only in ready-to-use quantities and thus no packaging of the final product is required (3 – 5, 11).

The Republic of Korea, the 9th largest cosmetics market in the world (International Trade Administration, 2020), is one of the leaders in the development trends of personalized cosmetics. In 2016, the South Korean government started the first pilot projects on personalized cosmetics targeting type *c* cosmetics, especially those made *on site*, by easily making bases and ingredients for colors, odors and functionalities according to consumer preferences (6, 7, 10, 12).

Prior to 2020, the Cosmetic Act prohibited mixing or splitting cosmetics into small portions in *retail* stores, although demand for personalized cosmetics was steadily increasing. This required changing legislation, but with the safety of personalized cosmetics ensured. With the implementation in 2020 of type *c* Custom Cosmetics System in the Republic of Korea, a Custom Cosmetic Product is a cosmetic product that can be customized according to personal preferences or skin type by a "Certified Technical Manager for Custom Cosmetics" at a retail store (6, 7, 10, 12).

Under the Cosmetic Act revised in 2020, a certified technical manager for custom cosmetics can split or mix cosmetic ingredients in an authorized store and with authorized personnel for this purpose. The Cosmetic Act also revised the safety standards of custom type *c* cosmetics by updating the list of cosmetic ingredients prohibited or restricted for use.

For example, extracts and volatile oils obtained from the flowers of *Tagetes erecta*, *Tagetes minuta* and *Tagetes patula* species widely used as cosmetic ingredients in perfumes have been subject to restriction. In this respect, extracts and volatile oils obtained from the flowers of *Tagetes erecta*, which are already banned on the cosmetics market in the European Union, are also included in the list of prohibited cosmetic ingredients in the Cosmetic Act (6, 7, 10, 12).

Extracts and volatile oils obtained from the flowers of *Tagetes minuta* and *Tagetes patula* species are also listed as restricted cosmetic ingredients for use, within the same concentration limit as in the European Union (0.1% in rinse products), which demonstrates the quality and safety control of cosmetic ingredients harmonized with international standards (6, 7, 10, 12).

Among the regulations recently revised in 2020, changes to labelling requirements can be considered relevant for non-Korean manufacturers and distributors.

Thus, "Standard on marking cosmetics. Precautions for Use and Allergens in Perfume" has been updated to require all cosmetic manufacturers to indicate the presence of 25 known allergenic chemicals, by the name INCI (International Name of Cosmetic Ingredients) in Korean, if their concentrations in finished products exceed permissible concentration thresholds (6, 7, 10, 12).

On 10 November 2022, National Medical Products Administration (NMPA) launched a personalized cosmetic pilot service that runs for a year in five provinces/municipalities, in Beijing, Shanghai, Zhejiang, Shandong, and Guangdong. It aims to satisfy the diverse demand of consumers by exploring the replicable model of personalized cosmetic service and effective supervision (13).

In april 2023, Shanghai issued its first license for *on-the-spot* personalized cosmetics service, marking the launch of a pilot program for such a service in the city (14).

3. Conclusions

Regulations on customized cosmetics is challenging, but in fairness, compliance is achievable in most situations, especially by the market in the Republic of Korea by updating the

Cosmetic Act. South Korea introduced the world's first legislation of custom cosmetics in 2020.

In the European Union, from this perspective, a personalized cosmetic product on the market (online purchase with production at regular units; mixing *in situ*; mixing with a household device; mixing boosters with a cosmetic base) does not fully ensure compliance with regulations in the field.

A new, updated guide harmonizing regulations for personalized cosmetic products should enable best practices for the Single Market, ensuring their quality and safety.

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