

Mandom Discovers that “Basic Blue 124” Dyes Hair but Does Not Easily Dye Skin: Applying this Finding to the - Development of Hair Color Conditioners -

Mandom Corporation (Headquarters: Osaka; President Executive Officer: Motonobu Nishimura; hereafter, Mandom) has been involved in the development of hair color products that are comfortable to use.

One type of hair color product is the at-home, low-hassle “hair color conditioner.”*¹ Basic dyes*² are used in hair color conditioners. However, increasing the amount of dye to heighten dyeing power causes skin to be dyed as well, which has long been a problem with these products. We have found that a certain basic dye, Basic Blue 124, has the special characteristic of coloring hair without coloring skin. Because Basic Blue 124 does not dye skin, we can increase its use in our products. As a result, hair color conditioners into which Basic Blue 124 has been incorporated will maintain their color hold while requiring less time to set than existing products.

1. The Search for Dye that Colors Hair but Does Not Easily Color Skin

Several types of dyes are used in cosmetic gray hair dyes, but in hair color conditioners, basic dyes are one of the most frequently employed types. Among basic dyes, selection of blue-colored dyes is especially important because they effectively darken hair. However, if too much blue dye is incorporated into a product, it begins to dye not only hair, but also the skin of the hands and face.

Thus, we focused on the hydrophobicity of the skin, assuming that highly hydrophilic dyes would not easily permeate the skin. We began to search among the dyes that meet our safety standards for one with particularly high hydrophilicity. As a result, we discovered that Basic Blue 124 dyes hair but does not easily dye skin—any dyeing of the skin can easily be washed out (Figure 1).

2. Evaluation of Hair and Skin Permeability of Basic Blue 124

We evaluated the permeability of hair to the dye by making an oblique cross-section of dyed hair and examining it with an optical microscope (Figure 2). After examination, we discovered that Basic Blue 124 had permeated the surface of the hair and nearby regions in the same way that the blue dyes in our existing products do.

We evaluated the permeability of skin to the dye by vertically sectioning cultured skin whose surface had been exposed to dye and examining it with an optical microscope and TOF-SIMS*³ (Figure 3). We found that, compared to the blue dyes incorporated into our existing products, Basic Blue 124 did not permeate the inner layers of the skin.

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3. Applying Basic Blue 124 to Our Products

We developed a test hair color conditioner that takes advantage of Basic Blue 124’s high hair permeability and low skin permeability and compared this test product with our existing products. We found that, while our existing products required a setting time of 5 minutes, setting the test product for only 3 minutes did not affect its dyeing power and prevented it from dyeing the skin (Figure 4).

In the future, we will continue to implement Basic Blue 124 in our products and develop hair color products that consumers can use comfortably and safely; we plan to do this through continuously advancing our technology. Notes:

- *1 A cosmetic product used as a hair conditioner that gradually decreases the noticeability of gray hairs. It is applied after using shampoo, allowed to set for a few minutes, and then washed out.
- *2 Dyes that have positive charge; they have the ability to dye the surface of the hair and surrounding areas.
- *3 TOF-SIMS (Time-of-Flight Secondary Ion Mass Spectrometry)
An analytical method in which a sample is irradiated with an ion beam and ions emitted from the sample surface are detected, allowing the presence of the target molecule to be identified. Substances with masses close to that of the target molecule on the sample surface may appear as noise.

[Reference Materials]

Figure 1: Comparison of Basic Blue 124’s Dyeing Power and Dye in Existing Products
Dyeing power (bundle of human gray hair) and skin staining (after washing with soap)





	Dyeing power (bundle of human gray hair)	Skin staining (after washing with soap)
Basic Blue 124		
Blue dye contained in our existing products		

Figure 2: Evaluation of Dye Permeability into Gray Human Hair (Optical Image)




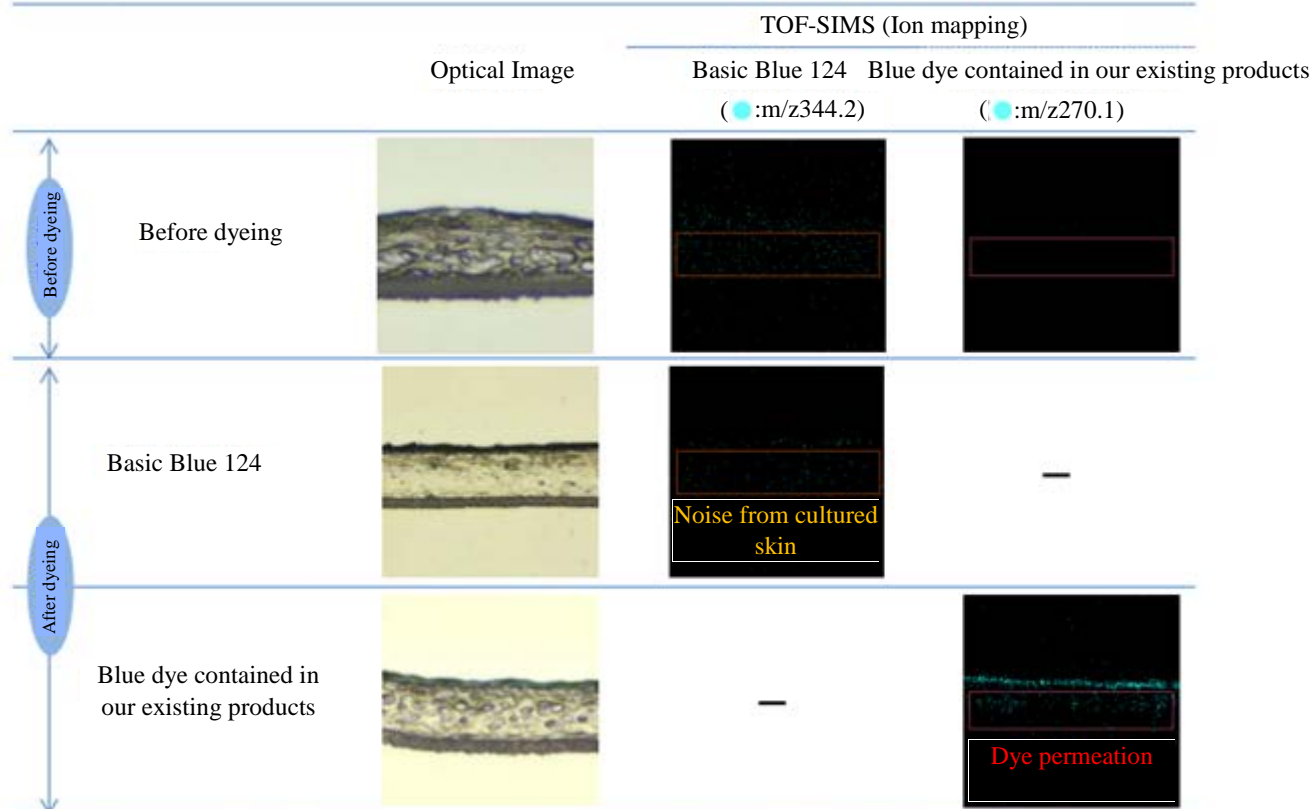
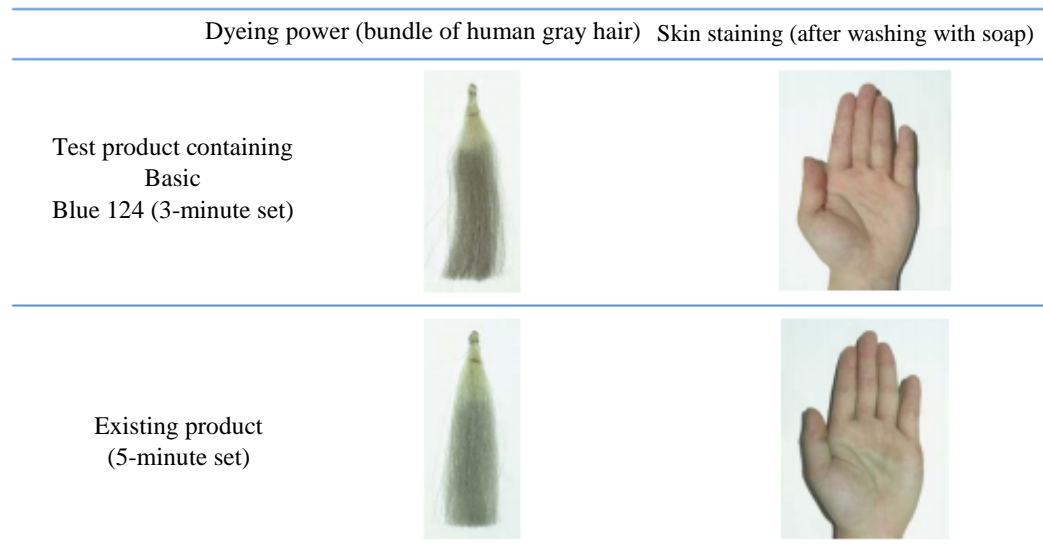
Basic Blue 124		 Oblique cross-section
Blue dye contained in our existing products		

Figure 3: Evaluation of Dye Permeability into Cultured Skin (Examination of Cross-Section)



*Basic Blue 124-specific m/z 344.2 was detected from cultured skin before dyeing. And after dyeing with Basic Blue 124, the same distribution (no concentration gradient from the surface) was observed, indicating that this is noise from the cultured skin.

Figure 4: Comparison of Dyeing Power of Test Product and Existing Product



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