Synopsis of Original Research Paper

Development of Safer Hair Dyeing Technique by Using Biobased Materials

Hidekazu Yasunaga

Kyoto Institute of Technology Department of Fibre Science and Engineering

The author has studied the invention of novel human hair dyeing techniques, which are milder and safer for a human body, in order to decrease the risks accompanying hair dyeing. In the paper, the results on a variety of hair dyeing techniques by using biobased materials are reported. The dyeing technique uses flavonoids such as (+)-catechin (Cat) as the dyestuff precursors. The precursors are oxidised and dyeing hair is performed by three kinds of methods as follows: i) dyeing hair by a redissolved catechinone dyestuff, which is preliminarily obtained by the oxidation of Cat enzymatically or chemically, "redissolution dyeing," ii) dyeing hair with Cat solution during enzymatic or chemical oxidation reaction, "simultaneous oxidation dyeing" and iii) dyeing the hair by oxidising enzymatically or chemically, which is treated previously with Cat, "post-oxidation dyeing." The resulting colours of hair samples were compared in order to find a better technique showing higher dyeability.

Next, the biocatechol materials, such as (-)-epicatechin, L-3,4-dihydroxyphenylalanine, hematoxylin, brazilin, rosmarinic acid, caffeic acid and chlorogenic acid were used to dye hair by the enzymatic simultaneous oxidation or post-oxidation dyeing method and their dyeability was estimated. It was found that the bio-catechols containing chroman (3,4-dihydro-2*H*-1-benzopyran) structure such as Cat, EC, HX and BZ are useful for hair colouring and a variety of colours are obtained.

On the other hand, dyeing hair by using saccharides and amino acids was tried. Yellowish brown and brown hairs are obtained by heating the dyeing solution, in which they are involved. The colour fastness to ultraviolet light and washing for hair dyed by the technique is very high. It was revealed that the dyeing temperature is decreased and dyeing time is shortened by the addition of bio-polybasic acids.