

Periodic Graphics

A collaboration between C&EN and
Andy Brunning, author of the popular
graphics blog *Compound Interest*

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online

To see more of
Brunning's work, go to
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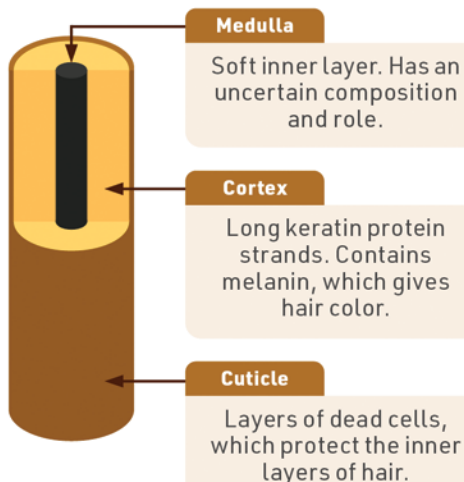
Summer hair color changes



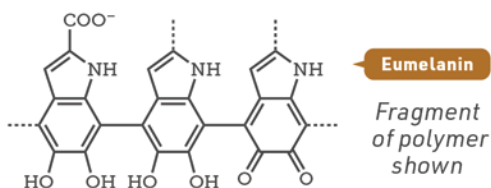
Swimming pools, sunscreen, and the summer sun can all affect lighter hair colors. In this graphic, we look at the chemistry behind how some summer activities may alter some hair colors.

The structure of hair

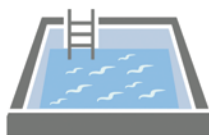
Hair has three distinct layers: the medulla, the cortex, and the cuticle.



Two melanin pigments, eumelanin and pheomelanin, give hair its color. Darker hair contains more eumelanin.



Swimming pools and green hair

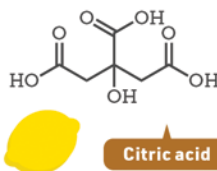


Copper sulfate

Common algicide in swimming pools

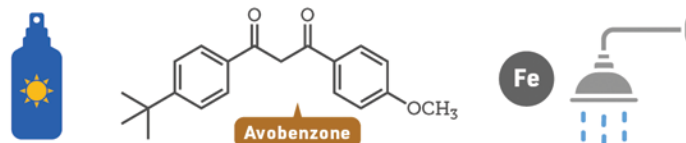
Copper in swimming pool water, often from copper-containing algicides, can turn light-colored hair green. Chlorine oxidizes the copper, producing green copper compounds, which bind to keratin proteins in hair strands. The resulting discoloration is known as chlorotrichosis. Shampoos with chelating agents can remove this discoloration.

Lemon juice and bleached hair



Lemon juice contains citric acid. When squeezed on hair and exposed to the sun's ultraviolet light, it penetrates the hair cuticle and breaks down melanin, lightening hair color.

Sunscreen and pink hair



Avobenzone is a UV-absorbing compound used in some sunscreens. When it interacts with iron in pool water or shower water, it can form complexes that turn clothes, light-colored hair extensions, or dyed hair orange or pink.



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