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.

- **Medulla**: Soft inner layer. Has an uncertain composition and role.
- **Cortex**: Long keratin protein strands. Contains melanin, which gives hair color.
- **Cuticle**: Layers of dead cells, which protect the inner layers of hair.

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

Swimming pools and green hair

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.

- **CuSO₄**: Copper sulfate
  - Common algicide in swimming pools

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.

- **Citric acid**: Lemon

Sunscreen and pink hair

Avobenzene 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.

- **Avobenzene**: Sunscreen ingredient
  - Fragment of polymer shown

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