

High levels of copper present in the water may cause blond hair to turn green. This happens when the concentration of copper is greater than 0.3 parts per million and the hair cuticle is damaged by physical factors (e.g., brushing, hot drying, and sun exposure) and/or chemical factors (e.g., peroxide bleaching, permanent waving, use of alkaline or tar shampoos, and exposure to chlorinated water).

The cuticular damage opens up a pathway for the copper in the water. A study has shown that damaged hair will adsorb 3 times more copper than undamaged hair. The green discoloration is more apparent on people with blonde, gray, or white hair. People with dark hair may have the same copper concentrations as those with blonde hair, but the color change would not be as apparent.

### **Copper in swimming pools and tap water:**

- Algaecides used in swimming pools may contain copper as the active ingredient.
- A decrease in pH causes leaching of the copper and brass piping and pool equipment. Intermittent operation of pumps coupled with pool skimmers can cause low pH slugs.
- Concentrations of copper in tap water accumulate over time as the water is replenished in pools (due to losses from evaporation and splashing).
- Electrical grounds to copper water piping coupled with sufficient electrical current may dissolve more copper into the water.
- High concentrations of copper may be present when stagnates in plumbing fixtures for several hours. Flushing out the water by running the faucet from 1-5 minutes can help alleviate this build up.

### **Tips to Prevent Green Hair:**

- Keep pool conditions at levels recommended by pool professionals
  - pH between 7.2 and 7.8
  - Free available chlorine at 3.0 to 5.0 mg/L
- Use swimmers' shampoos and conditioners.
- Do not use alkaline shampoos.
- Use a swim cap to prevent the chlorine from damaging the hair.
- After taking a swim, do not allow the hair to dry. Wash immediately with shampoo.
- Limit over-processing of the hair (e.g., brushing when wet, blow drying, bleaching)

### **Remedies for Green Hair**

- Use shampoos containing edetic acid (EDTA). These products are intended to recondition overbleached or discolored hair, or hair overexposed to the sun and salt water.
- Treat the hair with D-penicillamine-containing shampoo. A 250-mg capsule dissolved in 5 mL of water and 5 mL of shampoo followed by a bottled water rinse. The treatment is effective within a few days.
- Bleach the affected area with 3% hydrogen peroxide. Bleaching lightens hair color and produces cuticular damage making the hair prone to future copper adsorption.