

## Teeth Whiteners

### Why Do Teeth Become Discolored?

Dental hygiene is big business; sales of teeth-whitening products are soaring. After your braces, will your teeth be stained or Hollywood white? There are two ways that teeth may become discolored. The antibiotic tetracycline, excess fluoride, or trauma can darken or reveal the yellow inner tooth. Coffee, tea, cola drinks, or smoking attack the outer surface. Common whitening methods target only outer stains.



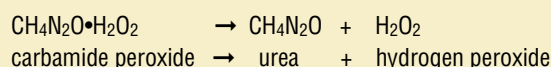
HTTP://DENTISTRYVU.EDU/ORGANOFACIALGENETICS/PRESORTED.HTM

The yellow layer beneath the white enamel protects your teeth as you chew. Enamel, the hardest substance in your body, is composed primarily of calcium and phosphate ions bundled into microscopic crystalline rods (see photo). When spaces between the rods fill with organic material, the stains become too deep to brush away.



### How do they work?

All teeth-whitening options, except the natural method, use hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) as the oxidizing agent. Carbamide peroxide, is used as the H<sub>2</sub>O<sub>2</sub> source in many products. This molecule decomposes in water, yielding H<sub>2</sub>O<sub>2</sub> as follows:



H<sub>2</sub>O<sub>2</sub> is a strong oxidant and reacts rapidly with the electron-rich molecules that discolor the teeth. The stain molecules are broken into smaller molecules with less color, so the teeth appear whiter. **The whiteness of your teeth and the time required depend upon the concentration of the solution.**



### What are the options?

There are four basic options for whitening teeth:

Option	Process	Time	Expense
Professionally applied	Gums protected; dentist uses concentrated bleaching solution (35%*) prepared for your teeth and bright light which accelerates the reaction	one 30-60 minute session	\$500-\$650
Dentist-prescribed	Soft tray molded to fit your teeth; take-home custom made concentrated bleaching gel (16-22%)	2 hours per day for 2 weeks	\$200-\$350
Over-the-Counter Preparation	Do it yourself; apply thin plastic strips coated with dilute bleaching solution (10-22%)	20 minutes per day for 2 weeks	\$35-\$60
Natural Method	Fruits contain malic acid; eat an apple or apply mashed strawberries to your teeth	5 minutes per day	Negligible (cost of buying fruit)

\*% carbamide peroxide solution

Check out  
**CHEM MATTERS**  
online:  
[www.acs.org/chemmatters](http://www.acs.org/chemmatters)



### Are teeth-whitening methods safe?

According to the **American Dental Association**, bleaching with 10% carbamide peroxide or 3.6% hydrogen peroxide is considered safe and effective. Bleaching may initiate temporary tooth sensitivity or gum irritation, and the stronger concentrations may cause damage, but they generally contain fluoride to protect the enamel. Drugstore products are designed for healthy teeth, so visit your dentist first and follow the package directions. If you decide to whiten your teeth, know your options. And to maintain the white color on your teeth: Brush, floss, and eat an apple after drinking coffee, tea, or cola drinks.