

# SPECIAL REPORT

## WHY WHITE MARBLES TURN YELLOW: CAUSES AND CURES

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*Sitting in my office one morning I received a call from a very upset home builder. He told me he was building a two million-dollar home on the west coast of Florida. They had installed nearly 3500 square feet of a white statuario marble tile. Over a weekend one of the water pipes broke in a bathroom and completely flooded the home. He explained that they managed to vacuum all the water and had assessed the damages. Besides warped wood, soaked drywall and an irate homeowner, the marble tile seemed fine except for some minor water spotting.*

*After several weeks the replacement of warped wood and drywall had begun when he noticed the white marble tile turning yellow. At first he thought it might be some type of residue so they tried cleaning the marble with some bleach and water. But, the yellowing was still there. The homeowner was getting more and more irate and was threatening a lawsuit. He asked if I could get down there right away and take a look at the marble and make some suggestions for what to do.*

The above story is not uncommon and is a frequent occurrence on white marble tiles exposed to flooding. Can the yellowing be removed or does it need to be replaced? What causes the yellowing and will it get worse? The following is an explanation of yellowing in white marble and some techniques that may help.

### Why Does White Marble Turn Yellow?

The problem of yellowed white marble is not uncommon. All over the United States I have encountered marble that has become discolored yellow or brown. There are several reasons this color change will occur.

**1. IRON STAINING.** In the above example with the home builder, the yellowing was a result of oxidation. Many white marble tiles contain naturally occurring deposits of iron. Iron is a mineral found in stone and can occur randomly throughout the stone. If iron is present in the marble tile, it will begin to oxidize when exposed to water or other oxidizers such as acids or household bleach. White marble tiles can remain on a floor for years without yellowing, then over time may slowly turn yellow and in severe cases may turn completely brown. This oxidation process is accelerated when the tile is saturated as with the flood in the above example. This process of oxidation is similar to the rusting of metal. If you expose a brand new nail to water and air it will rust and turn brown. The same process is occurring with the iron in the marble. If water and/or air is eliminated the iron will not oxidize. This is the reason certain white marble suddenly turns yellow. The process is difficult to reverse and replacement of the tile may be necessary.

The following stain removal technique has proved successful in several cases. Before testing this procedure it is important to first determine if iron is the cause.

### **Testing for Iron**

Before assuming the marble is yellowed due to iron be sure to consider possible causes #2 and #3 detailed below. If these procedures fail then testing for iron will be necessary.

- a. If a flood has occurred or excessive water was used, first check the water for iron. There are several inexpensive test kits available that can be used to check the iron content in water. Check with your local plumbing supply store or store carrying water softening supplies. If any amount of iron is detected, it is possible that iron has entered the stone through the water supply. To eliminate the iron there are chelating chemicals that can be added to the water to prevent the iron from staining. This is very important if the tile is being cleaned with this water.
- b. Whether or not the water contains iron, the tile itself should be checked for iron content. Remove one tile and have a testing lab analyze it for total iron. If there are spare tiles that have never been installed also have them tested. If iron is present naturally in this stone it will probably be detected in the spare tile. If the results indicate the presence of iron in the tile, the following testing should be done:
- c. Check the tile for moisture. A moisture meter is a useful instrument that can be employed to check the tile for moisture. If the tile contains moisture, it is very possible that iron is beginning to oxidize.

### **Removing Iron Staining**

1. Prepare a poultice solution the consistency of peanut butter using water and the following chemicals: Sodium Hydro Sulfite and Sodium Metabisulfite. (These chemicals are available in a product called Iron-Out™ from your plumbing supply or home center.) Apply the poultice to the affected tile. Allow it to soak into the tile and keep wet for several hours. Do not allow the solution to dry. After several hours pick up excess solution with a wet vacuum and rinse thoroughly with water and a chelating agent such as EDTA. Be prepared to repolish the marble since these chemicals can cause etching.
2. If the above procedure fails, prepare a poultice with diatomaceous earth and Iron Out™ (One part Iron Out™ to 5 parts diatomaceous earth.) Mix with water to create a thick paste and apply to a small area. Cover with plastic and allow it to sit covered for 24 hours. After 24 hours, remove the poultice and rinse the area with water and a chelating agent. If the stain is removed, the entire floor can then be treated. If the stain still remains, replacement is the only solution.
3. Before the above procedure can be performed, it is important that the affected tiles be dry. If water or moisture are still present, oxidation of iron may continue.

There are also some new chemicals that are available which contain Ammonium Thioglycolate which look promising for removing surface iron oxidation. Check with several stone maintenance supply companies.

The yellowing of white marble from oxidation is a common problem. New installations should be sealed with a good quality penetrating sealer (impregnator) which will help prevent oxidation of the iron by eliminating moisture. The above procedure has proven successful in some cases of iron staining. However, if the outlined test does not produce the desired results, I would recommend replacement of the affected tiles.

**2. IMPROPER MAINTENANCE.** As marble wears the highly polished surface begins to disappear. The wearing of this polish causes the surface to become rough become a magnet for dirt. If improper cleaners are used, this dirt will accumulate in the pores of the stone and will turn it yellow. It is surprising how often I have seen this condition on marble. Upon investigation in these cases I have frequently found dirty mops were being used. Mops used to clean the restrooms and/or kitchens were also used to clean the marble floors. Floors are mopped with strong cleaners or wax cleaner combinations or with no cleaners at all.

**Cure:** If you suspect yellowing due to improper maintenance, the marble tile will have to be cleaned with an alkaline marble cleaner. I would suggest a heavy duty stone cleaner. Be sure the stone cleaner you buy is alkaline and

not an acid since acid will dull the polish. Apply the cleaner to the marble and scrub with a soft brush. Be sure to rinse the floor thoroughly. It may be necessary to repeat this procedure several times to remove all the imbedded dirt. If after being cleaned the marble is dull I would suggest repolishing and an application of a good quality penetrating sealer (impregnator). If after several cleanings the yellowing is not removed then proceed to the next possible cause.

**3. WAX BUILD-UP OR COATINGS.** Many marble floors are coated with waxes, acrylics, urethane or other coatings. Many of these coatings are not specifically designed for marble floors. Some of these coatings are of poor quality and the coatings themselves will begin to yellow. It is not uncommon for coatings to be applied in multiple coats. As the coatings build up it becomes soft and dirt is easily embedded in the soft layer. These coatings require frequent stripping which is often neglected.

**Cure:** To remove yellowing due to a wax or coating buildup the marble will need to be stripped with a commercial wax stripper. I would strongly suggest using a stripper manufactured by the same company as the floor wax or coating. This will help avoid incompatibility problems. Follow the directions on the stripper's label and be sure to rinse the floor thoroughly. These strippers often require the use of abrasive pads which can scratch and damage the marble surface. Before undertaking the entire project, perform a small test to determine results.

**4. RECRYSTALLIZATION.** Another process used for polishing marble floors is a process known as recrystallization (also referred to as crystallization). If this process is applied to a white marble floor that contains moisture it will turn the marble yellow. If recrystallization is to be used, it is important that the marble be dry.

**Cure:** If the marble tile has been recrystallized, it will be necessary to remove the recrystallized layer. This layer can often be removed by polishing the tile with a powder marble polish containing oxalic acid. Apply the powder to the tile, add water and work into a slurry with a hog hair pad and a standard buffing machine. Continue to work until yellowing has disappeared. If this technique fails then the tile will have to be re-honed. It is strongly suggested that the polishing and honing procedure be performed by trained individuals.