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## Efflorescence

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### What causes a whitish residue on grout?

Generally there are a few possible causes for white residue on colored grout. When there is a whitish mineral residue on the grout, commonly this is caused by efflorescence. Similar to the white powder left in a drinking glass when a glass of water is left to evaporate, efflorescence is caused by minerals that are soluble in water being dissolved and transported to the surface of the grout as the water evaporates.

Typically, the minerals originate in the cement slab below the tile or in the ground below the slab.

Except in the rarest of cases, efflorescence does not occur from the small amount of minerals in water used to wash a floor. Nor when tile is installed with thinset (tile cement) are there enough soluble salts in the thinset to cause efflorescence.

Occasionally, when tile is installed over a thick mortar bed, the mortar could provide a sufficient amount of soluble salts to cause efflorescence but only if moisture is regularly passing through the mortar bed.

The next question must be where is the water coming from? Similar to the glass of water analogy, it takes a lot of water to dissolve enough minerals to be noticeable. As previously stated, typical cleaning does not provide enough water to cause efflorescence. Even saturating the grout joints with water during periodic cleaning generally does not cause efflorescence.

In exterior installations over concrete, rain can cause efflorescence over time when other conditions are right - especially with poorly compacted or porous grout.

More commonly, there can be moisture in the ground below the slab that is always evaporating. Even when a vapor membrane is installed below the slab, penetrations in the membrane may allow sufficient moisture to cause efflorescence. This moisture, invisible to the eye, is steadily traveling through the slab, the tile cement, and the grout. More efflorescence will be observed if the concrete and grout are more porous.

### How do you minimize efflorescence?

There are generally effective ways to minimize this problem before tiling and some less effective options after the tile is in place.

Before tiling, if regular vapor migration is detected, remedial steps should be considered before tiling. Alternatively, a vapor equalization membrane can be installed before the tile is installed. There are also companies that sell coatings claimed to reduce moisture migration; however, these may interfere with the ability of the tile cement to bond to the substrate and should only be used if both the manufacturer of the tile cement and the manufacturer of the coating will warrant the installation system.

After tiling, sealing the grout with a penetrating vapor permeable sealer may help retard the rate of evaporation. Note: some caution must be observed in selecting the sealer. Topical sealers (acrylic sealers) which coat the grout joint and are not vapor permeable may turn white from reactions between the acrylic and moisture. This is not efflorescence. Rather this is similar to the whitish haze seen with floor wax when it is applied to a damp surface.

### What is "latex leaching" and "dirt deposition?"

Less common than efflorescence is the white residue that can form on polymer-modified grout if the grout is subjected to excessive moisture before the polymers coalesce. Polymer additives are often added to grout to provide superior properties, commonly improved chemical resistance, reduced porosity, improved flexibility, and freeze/thaw stability. These additives are either already in the grout as redispersible powders or are added in liquid form. In both cases, grout mixed with too much water or cleaned too soon, or cleaned with excess water can cause the polymer to migrate to the surface. In many cases (but not all), these polymers are white in color. When the excess water evaporates, the white polymer is exposed.

In areas with light-colored soils or near light-colored carpeting, occasionally light-colored residue is seen on the grout when detergents used on the tile and grout have not been fully removed. Although the detergent residue is often virtually invisible, it can combine with the soil to form a sticky film that builds up over time. Because the grout joint is commonly lower and more porous than the tile, the dirt tends to be observed in the grout joint. In severe cases, the dirt will also discolor the tile.

Very often, a tile floor can be cleaned with hot water or extremely small amounts of cleaner. Preferably, the dirty water should be vacuumed off the floor. If not possible, sufficient rinse water should be used to remove all traces of the dirt and cleaner.

### How do I clean off the "white stuff" on my grout?

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Solving the problem of residue on grout depends greatly on the cause of the problem - with ongoing moisture migration through concrete being the most difficult.

Generally efflorescence is removed with an acid. However, grout manufacturers do not advocate the use of acids because they attack the cement in the grout. Used judiciously though, this can be a highly effective way of removing efflorescence. There are several products on the market for this with different acids and strengths. In all cases, extreme care should be used to protect the person applying the acid and surrounding fixtures. Generally, it is best to employ an experienced professional for this type of work. Also, acid that is too strong can strip some color out of grout (which is also undesirable) and acid generally cannot be used if acrylic sealers have already been applied to the grout.

After successfully removing the efflorescence, it can only reappear if moisture is entering the system. At this point, sealing the grout joints with a penetrating sealer may be recommended depending on the entire tile assembly. The sealer will minimize water entering from above (for example, from rain) and slow down the rate of evaporation of the water entering from below. However, they should not be used if a water sensitive material (like mastic and some self-leveling products) was used in the tile assembly and there is water migration through the substrate.

For removing a whitish residue from polymer migration, solvents or strong cleaners are needed. As there are many different polymers that could have been used in the grout, any one cleaner may have more or less efficacy. Possibly, an acid could work by removing the surface layer of grout molecules to which the polymers are attached.

For removing soapy dirt stuck to the grout, generally multiple rinsing with clear water and some brushing of the grout joints will be effective. As noted previously, vacuum extraction (for example, with a shop vac) provides the easiest and best results.

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