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What Is Efflorescence and How to Remove It

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Efflorescence is a crystalline deposit of salts that can form when water is present in or on brick, concrete, stone, stucco or other building surfaces. It has a white or greyish tint and consists of salt deposits left behind when water evaporates. In addition, efflorescence can appear as a powdery substance on floors and walls and requires special care to treat.

Let's take a closer look at efflorescence and what you can do to prevent it.

What Causes Efflorescence?

You may notice efflorescence both indoors and outside, and it can vary in frequency and intensity throughout the country due to moisture and temperature.



Water, rain and snow are the primary sources of moisture and may impact the degree of efflorescence

Three conditions must exist for efflorescence to occur:

- Water-soluble salts must be present.
- Moisture must be available to transform salts into a soluble solution.
- Salts must be able to move through a material to its surface. The moisture will then evaporate and cause the salts to crystallize, resulting in efflorescence.

Water, rain and snow are the primary sources of moisture and may impact the degree of efflorescence.

Condensation, groundwater wicking and interior activities also may affect the degree of moisture generation.

In many instances, efflorescence may occur during home construction. If masonry units are left out overnight during construction, they can absorb moisture from damp soil and rain. It is essential for masonry units to be covered and left in pallets to minimize the risk of efflorescence throughout a construction project.

Various building surface installation problems may lead to efflorescence, including:

- Incorrect use of through-wall flashing
- Use of masonry without sufficient ventilation
- Use of masonry in areas that lack a proper moisture barrier
- Joint material failure
- Improper ground storage

Efflorescence is often a seasonal problem, and humidity will impact whether soluble salts appear. It usually escalates in winter, since rain, snow, sleet and other inclement weather conditions may arise. However, efflorescence can still occur in spring, fall and summer.

How to Spot Efflorescence

Understanding the differences between efflorescence and stains is critical. Stains usually come in various colors but may appear similar to efflorescence at first. Efflorescence is a white, powdery substance that can be found on unsealed surfaces, including:



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Brick: Since it is a porous material, brick may absorb soluble salts. To find out whether efflorescence will be a problem for your brick, take a single brick and immerse it in distilled water for approximately seven days. Let the brick dry after the seven days and compare it to a brick that was not immersed. If you notice a white, powdery material on the brick, it likely has effloresced.

Cement: Portland cement represents the key [contributor to efflorescence in mortar and grout](#), according to the Brick Industry Association (BIA). It is high in alkalis and is more likely to effloresce than other types of cement. Conversely, it is important to note that all types of cement contain some water-soluble alkalis, making any cement susceptible to efflorescence.

Lime: Lime is water-soluble and can react with unbuffered hydrochloric acid to produce calcium chloride that may migrate to a building material's surface. Comparatively, lime also has been shown to improve the bond between mortar and brick and increase the water resistance of masonry materials.

Sand: Sand is used in mortar and grout and is not water-soluble. On the other hand, sand can be contaminated with a material that can contribute to efflorescence. For building projects, using clean, washed sand that comes from sources free of contamination will minimize the chance of efflorescence developing.

Clay: Building brick and face brick consist of clay, which contains highly soluble salts. Clay may react with calcium sulfate that results in efflorescence.

Admixtures: An admixture's bond and strength may increase the potential of efflorescence with a building material. Generally, it is better to err on the side of caution with admixtures. If you do not know what is included in the admixture itself, you may want to avoid this solution entirely.

Backings: Concrete and other backing materials may contain soluble salts, contributing to efflorescence of brickwork. If sufficient water is present in backings, salts may dissolve, causing the backing materials to effloresce.

Trim: Caps, keystones and other trim may consist of building materials with soluble salts that can be difficult to control. As such, you should consider which trim materials to use before you start a building project to reduce the chance of efflorescence.

Any building materials that come into contact with the ground may be susceptible to efflorescence. But if you know the root causes of efflorescence, you can select the right building materials and prevent this problem from occurring. Efflorescing salts are associated with a number of building materials, including:

- **Calcium Sulfate:** A common efflorescing salt source in brick
- **Sodium Sulfate:** Often seen in cement-brick reactions
- **Potassium Sulfate:** Noticeable in many cement-brick reactions
- **Calcium Carbonate:** May be discovered in mortar or concrete backing
- **Sodium Carbonate:** Frequently seen in mortar
- **Potassium Carbonate:** Like sodium carbonate, commonly found in mortar
- **Vanadyl Sulfate:** Usually found in brick
- **Manganese Oxide:** Often present in brick

Choosing the right building materials is paramount for any building project. If you understand the impact of efflorescence on various building materials — and how to spot efflorescence — you should have no trouble minimizing this problem.

What Is Efflorescence on Pavers and Other Materials Indicative Of?

In French, the efflorescence definition means "to flower out." If you fail to control efflorescence properly, the issue can spread quickly.

Porous building materials such as concrete, pavers and stucco can absorb or wick water and draw salts to it.

The [International Association of Certified Home Inspectors](#) (InterNACHI) points out porous building materials can absorb or wick water over a six mile span, carrying it through the materials like a tree transports water from its roots to its leaves. This is known as capillary action. When efflorescence happens, it can be indicative of a moisture issue that could potentially damage the structure.

When water reaches a building material's surface, evaporation will occur. After the water evaporates, salt is left behind, but water absorption and wicking continue. This creates a high salt concentration, leading to osmosis.

Porous building materials can absorb or wick water over a **six mile span**



During osmosis, water moves toward salt to reduce its concentration, causing large hydrostatic pressures within the porous building material. As a result, these pressures can damage or destroy the material.

InterNACHI states osmosis can cause pressure that ranges from 2,000 psi to 3,000 psi, exceeding the structural strength of concrete. Therefore, osmosis may result in porous building material cracking, flaking or falling apart. Osmosis also may result in spalling, the separation of a building material due to hydrostatic pressure.

Ultimately, efflorescence itself isn't dangerous. However, it can lead to potential moisture problems that can cause structural damage to building materials. That means if you notice efflorescence in the basement or on concrete and other structures, it's important to take action.

Preventing Efflorescence

There are many solutions to prevent efflorescence, including:

- 1) Hydrophobic Sealant:** Applying an impregnating hydrophobic sealant to a building material surface can prevent the absorption of water. The sealant also will stop water from traveling within a building material.
- 2) Capillary Breaks:** Installing capillary breaks such as polyethylene sheeting between a building material and soil can minimize the risk of salt entering the material.
- 3) Quality Masonry Construction:** Implementing overhanging copings, eaves and flashings will minimize the risk of water from entering a wall.
- 4) Increased Emphasis on Landscaping and Sprinklers:** Paying special attention to landscaping and sprinklers will ensure you can prevent water from reaching porous building materials.
- 5) Installing Grout With Mechanical Vibration:** Consolidating grout with mechanical vibration will limit the chance of voids in the grout.
- 6) Using Dense Tooled Mortar Joints:** Leveraging dense tooled mortar joints reduces the porous nature of a wall, making it tough for salts to migrate through it.
- 7) Utilizing Grout Admixtures:** Grout admixtures, such as chemical additives that are designed to improve the flow of a grout mix and reduce its water content simultaneously, may reduce voids in grout.
- 8) Storing Masonry Materials Properly:** Keeping masonry materials off the ground and covering them with waterproof materials can protect these materials against groundwater and precipitation.

Ways to Troubleshoot Efflorescence

- 1) Assess the Affected Structure:** How old was the affected structure when the efflorescence first appeared? If the structure is less than a year old, the efflorescence source likely is the building material itself and/or water that entered the structure during construction. Or, if the structure is over a year old, you'll want to examine it closely for possible leaks. In this situation, efflorescence may occur due to a new source of water in the building material.
- 2) Observe the Location of the Efflorescence:** By looking at the location of the efflorescence, you might determine the water source that is causing the issue. You should also consider the recent use of the building when figuring out where the moisture originated. For example, if a building has been vacant for several months, various conditions may have occurred that could have contributed to efflorescence.
- 3) Check out the Building Material Condition:** Cracks or other defects in the building material may have led to efflorescence. Look at the condition of the building material and quality of the workmanship to identify any entry paths for moisture into the construction.
- 4) Review the Building Construction:** Evaluate wall sections and construction details to identify any possible moisture travel paths and sources of contamination by soluble salts. Check out the roof and wall juncture as well as flashing details. This review will help you determine the severity of the problem and potential steps to alleviate it.

5) Collect Laboratory Reports: If possible, you should review laboratory test reports to determine the presence of soluble salts in the building materials and the area. These reports will provide valuable insights that may help you identify efflorescence and other potential building issues.

6) Consider All Water Sources: Some of the most common water sources that may lead to efflorescence include condensation within a wall, leaky pipes and faulty drains. To identify all potential efflorescence sources, you may want to consider an extensive condensation analysis.

Allocating the necessary time and resources to prevent efflorescence can make a world of difference. By doing so, you can stop efflorescence from occurring — and reduce or eliminate the costs and time associated with removing this problem.

How to Remove Efflorescence



Some of the best ways to remove efflorescence include:

1) Pressurized Water: Applying pressurized water may dissolve efflorescence quickly. If you use water, dry off the water from the building material after application. If you fail to remove the water, crystals may remain that can cause efflorescence to reappear.

2) Diluted Vinegar: If you're in a pinch, using household diluted white vinegar can be used on efflorescence. It's less harmful than industrial chemicals and you most likely already have vinegar in your kitchen.

3) Brushing: With a strong brush, you can remove efflorescence with ease.

Removing efflorescence can be quick and simple. In fact, efflorescing salts are water-soluble, which means efflorescence may disappear on its own due to normal weathering.

To clean efflorescence off brick, it is crucial to complete this task in warm, dry weather. At this point, moisture may bring additional salts to the surface of brick, and the salts can be removed by dry brushing.