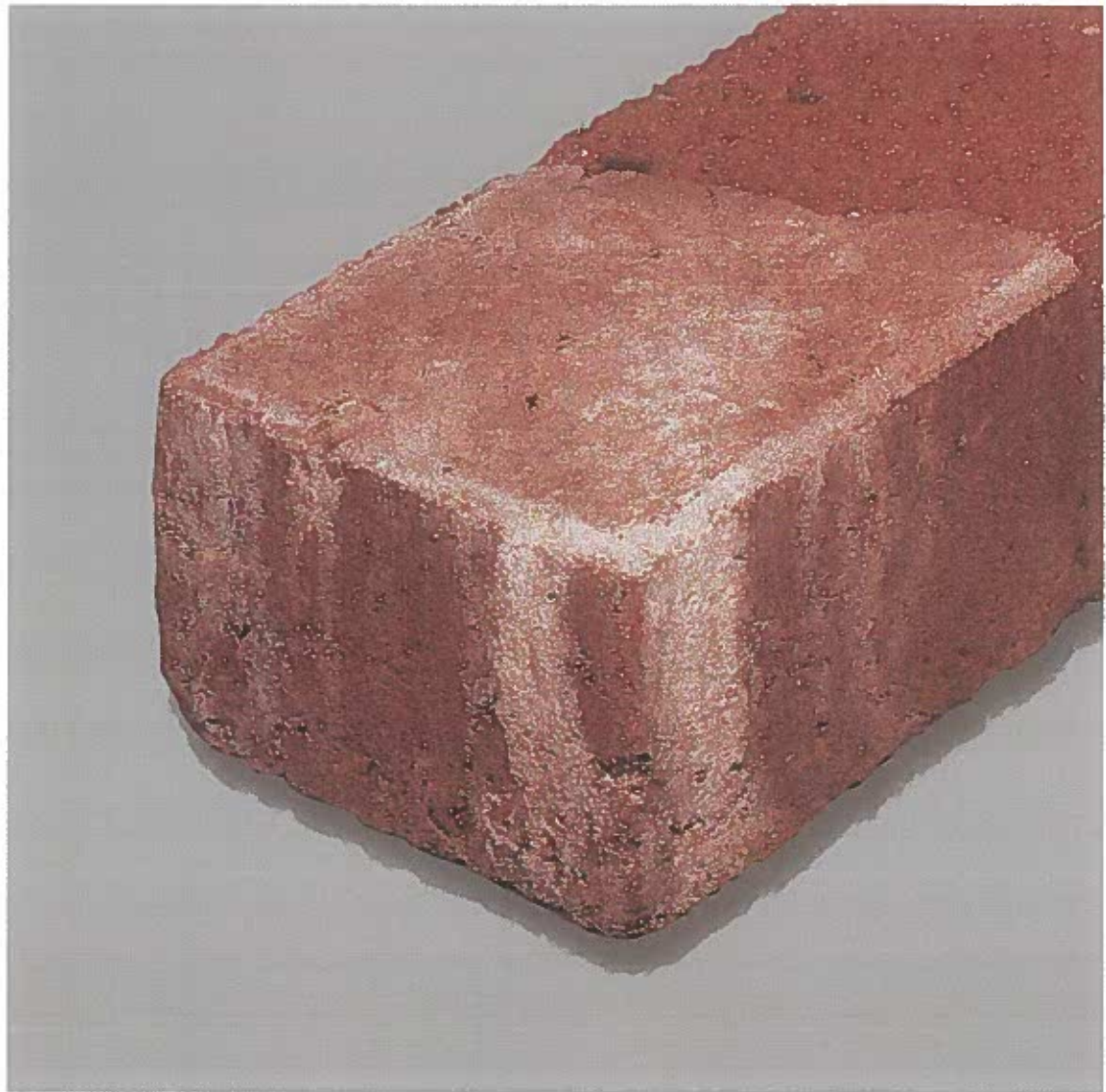


***Efflorescence.
A Temporary Problem.***



Efflorescence is the “frost” that sometimes appears on concrete products.



▲ *An example of efflorescence on concrete pavers.*

LANXESS Corporation was formed when the Bayer Group combined most of its chemicals businesses with large segments of its polymers activities. The company began doing business as a new legal entity in the United States on July 1, 2004. LANXESS will continue manufacturing Bayferrox® iron oxide pigments, which is a registered trademark of Bayer AG, Germany

Anything made with cement is susceptible to “frost” or efflorescence. Whether it’s concrete blocks and the mortar used to hold them in place, segmental retaining wall units, concrete roofing tiles or pavers, even poured concrete for roads, sidewalks, patios or driveways, efflorescence may happen.

The good news is that we know how and why efflorescence occurs. The bad news is that efflorescence is almost impossible to prevent. The silver lining is that efflorescence eventually goes away, although it may take a year or two.

Efflorescence comes from within the concrete itself.

All concrete products contain cement, and cement inherently contains lime. To make a concrete product, in addition to cement, a manufacturer adds specific amounts of other raw materials including sand, rock, water, chemical admixtures and pigments. These materials are mixed together then poured or molded into a specific shape. After all this happens, the material sits or cures for a period of time.

▶ *A beautiful application of colored concrete pavers without efflorescence.*

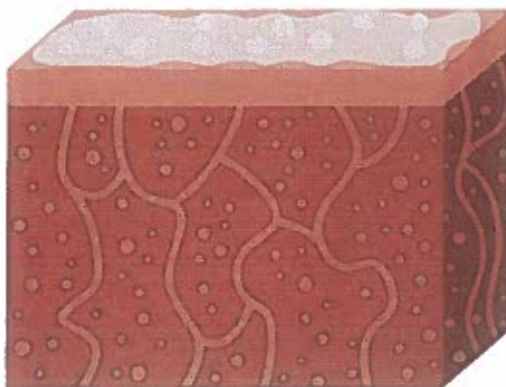
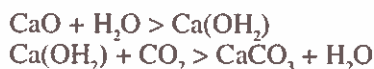


Although the concrete product is solid and useable after curing, it contains millions of microscopic pores or capillaries that go from the surface of the product down into its interior. As soon as the product starts to harden — which it will do for quite a while — the process of efflorescence may start.

How does efflorescence occur?

Water necessary to make the concrete - rain, moisture from dew or even water from your sprinkler system - reacts with the free lime in the cement forming calcium hydroxide. As the concrete product dries out, the water migrates to the surface through the pores in the concrete product carrying with it the calcium hydroxide. When the calcium hydroxide comes in contact with the carbon dioxide in the air, a hard white substance, which sticks to the surface of the concrete after the moisture evaporates, forms. This is the “frost” or efflorescence that you see. It will continue to form so long as the concrete is curing and the calcium hydroxide is free to move to the surface. The efflorescence phenomenon will stop when no more calcium hydroxide forms.

Technically, efflorescence is a calcium carbonate precipitate:



► An illustration of efflorescence on the surface of a concrete paver. The calcium hydroxide has been carried to the surface by water.

Just be patient. Efflorescence will go away.

The hard white “frost” eventually will dissolve in the presence of rainwater and carbon dioxide and wash away, but it takes time. Consequently, if you live in an area of frequent rain followed by sunny days, the entire process of efflorescence — from formation to elimination — will happen quickly. On the other hand, if you live in a drier, more arid climate, the entire process will obviously take longer.

Technically speaking, the “frost” degrades to water soluble calcium bicarbonate:



What if I can't wait?

If the “frost” is so obvious that it detracts from the beauty of your concrete product, a very dilute acid solution can remove efflorescence. You must know, however, that the acid can change the surface of your product, and that will alter its appearance. This change becomes especially noticeable on products that are colored with iron oxide pigments.

If you feel you must do something about efflorescence, you can follow these steps:

1. Put on protective goggles and gloves for mixing and application. A long sleeve shirt should also be worn.
2. Wet the surface thoroughly with water.
3. Mix water with hydrochloric (muriatic) acid. To dilute the acid, add 1 part acid to 10-20 parts water, making certain to add the acid to the water carefully.
4. Use a stiff brush to apply the dilute acid.
5. Allow solution to stay on the surface only about 15 seconds.
6. Wash it off thoroughly with water.

Make certain to follow (1) the concrete product manufacturers' recommendations and use appropriate safety precautions, and (2) all applicable environmental regulations managing wastewater resulting from this procedure.

The change in appearance of concrete products over time due to efflorescence.



Paver A was just made.



Paver B. The same paver a year later appears lighter because efflorescence is occurring.



Paver C. Again the same paver, 2 years after exposure, demonstrates that efflorescence eventually goes away and the paver looks nearly identical to when it was first produced.

Color makes the difference. And LANXESS makes the color.

LANXESS makes Bayferrox iron oxide pigments, and it's these pigments that bring concrete products to life. From deep plum to terra cotta shades of red, soft yellows through intense blacks, or virtually any shade of brown imaginable, it's the Bayferrox pigments that turn dull gray concrete into a work of art.

Bayferrox pigments do not cause efflorescence nor can they prevent it from happening. Efflorescence, unfortunately, is just more visible on colored products due to the lighter color of the "frost." Bayferrox pigments are lightfast and weather stable, and meet or exceed all requirements set forth by the American Society for the Testing of Materials (ASTM) for pigments used to integrally color concrete products. Therefore, the concrete products retain their strong colors for decades, even under extreme weather conditions. Long after the efflorescence has gone away, the rich Bayferrox colors will remain.

Health and Safety Information.

Appropriate literature has been assembled which provides information concerning the health and safety precautions that must be observed when handling the LANXESS products mentioned in this publication. Before working with any of these products, you must read and become familiar with the available information on their hazards, proper use, and handling. This cannot be overemphasized. Information is available in several forms, e.g., material safety data sheets and product labels. Consult your LANXESS Corporation representative or contact LANXESS's Product Safety and Regulatory Affairs Dept., Pittsburgh, PA.

The manner in which you use and the purpose to which you put and utilize our products, technical assistance and information (whether verbal, written or by way of production evaluations), including any suggested formulations and recommendations are beyond our control. Therefore, it is imperative that you test our products, technical assistance and information to determine to your own satisfaction whether they are suitable for your intended uses and applications. This application-specific analysis must at least include testing to determine suitability from a technical as well as health, safety, and environmental standpoint. Such testing has not necessarily been done by us. Unless we otherwise agree in writing, all products are

sold strictly pursuant to the terms of our standard conditions of sale. All information and technical assistance is given without warranty or guarantee and is subject to change without notice. It is expressly understood and agreed that you assume and hereby expressly release us from all liability, in tort, contract or otherwise, incurred in connection with the use of our products, technical assistance, and information. Any statement or recommendation not contained herein is unauthorized and shall not bind us. Nothing herein shall be construed as a recommendation to use any product in conflict with patents covering any material or its use. No license is implied or in fact granted under the claims of any patent.

Note: The information contained in this bulletin is current as of September, 2004. Please contact LANXESS to determine if this publication has been revised.

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