



## TECHNICAL INFORMATION SHEET

### WHAT IS EFFLORESCENCE

The term efflorescence is given to powdery deposits of salts that form on the surface of porous cement based building products such as bricks, mortar and concrete.

The salts are most often white (calcium carbonate CaCO<sub>3</sub>) or they may be yellow, green or brown (calcium sulphate complexes CaSO<sub>4</sub>.xxx).

### WHERE DOES IT OCCUR

Efflorescence is more likely to occur on the surface of porous materials like mortars and bricks than dense concrete. It is also more likely to form when a period of cool, wet weather is followed by a period of dry, hot weather. Water is required to carry the salts in solution to the surface of the mortar, concrete or brick-work.

Evaporation of water from the surface of concrete products acts like blotting paper drawing more water (and salts) out from the interior of the product.

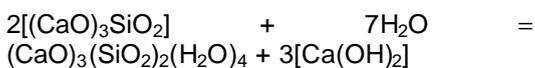
### HOW DOES IT FORM

To understand how efflorescence forms you need a basic understanding of how cement reacts with water to make the glue that holds concrete products together.

In simple terms efflorescence is a two step process:

#### Step One

58% of cement is made up of a man-made mineral called alite. The reaction of alite with water is shown below:

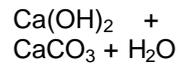


The formed complexes are complex calcium silicate (think of it as glue) and calcium hydroxide. Calcium hydroxide [Ca(OH)<sub>2</sub>] is

significant in that it remains in solution in the pores of concrete materials.

#### Step Two

The second step involves the reaction of calcium hydroxide [Ca(OH)<sub>2</sub>] and carbon dioxide [CO<sub>2</sub>] from the atmosphere and can be shown:



Calcium carbonate [CaCO<sub>3</sub>] is the white powder seen as efflorescence.

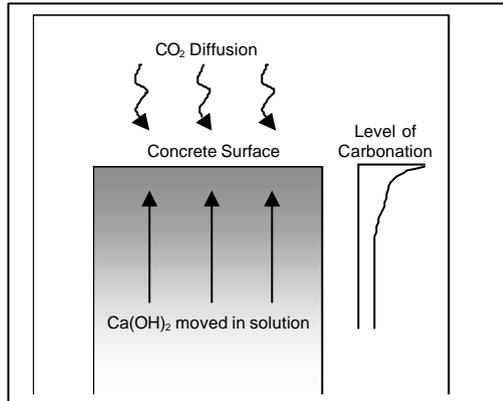
It is important to understand concrete products ARE porous. The pores are filled

with water and the water can contain high levels of calcium hydroxide.

Over time the calcium hydroxide is leached out from the surface layer and as the carbonation front (see the diagram centre) moves back into the concrete product lower amounts of efflorescence are experienced.

In many cases efflorescence is

never seen because it is hidden beneath the concrete surface in the pores, washed away by rain or blown away by wind.



### TREATMENT

Generally brushing the efflorescence off the wall using a firm bristled brush is the best remedy. In extreme cases a dilute 1:10 solution of hydrochloric acid (spirits of salts) is used to dissolve the efflorescence. Care must be taken before assuming yellow and green coloured crystals are efflorescence on brickwork. Vanadium stains from raw bricks are yellow to green and applying acid may make this problem worse.

EFFLORESCENCE