

Saponification of Paint Films



Saponification, the formation of water-soluble soaps, is most often associated with the chemical attack of an oil-based or alkyd paint by a highly alkaline masonry substrate. Masonry includes new concrete, tilt-up slab, stucco, plaster, mortar, etc. Alkyd and oil-based paints contain esters that react by hydrolysis and saponify with alkalis present in new masonry to form water-soluble soaps (PVA latexes can also be saponified, although to a lesser degree). The alkalinity may be concentrated at the paint/surface interface by moisture migration from the original mix with water or from external moisture ingress sources. At this point, the paint film is turned into a soap by this chemical process and becomes soft, sticky and water-soluble. This condition may be mistakenly reported as poor drying or that the paint is tracking, picking up dirt or peeling.

Curing Masonry

Most masonry materials come in powder form and are mixed with water. These materials are initially very alkaline or "hot" having a pH as high as 13 or 14 when first mixed. They must cure and dry out a minimum of thirty days before painting. During this period, the pH should drop to a more neutral state (ideally no higher than 10.0). If painted too soon, the applied paint film may be chemically attacked or saponified by the high alkalinity in the presence of moisture, as discussed above. Also, the initial high moisture content may cause blistering and other problems such as efflorescence.

Repainting

Under damp alkaline conditions there is no way to stop or reverse the saponification process. Complete removal of the decomposed paint film is required. The paint film can be scraped off with putty knives or other tools followed by thorough washing to remove all residue back to the clean substrate. Where applicable, a high pressure water blast may be the easiest procedure. Rinse thoroughly and allow to dry. Allow further curing of the masonry substrate if necessary. Identify and correct any external sources of moisture ingress into the substrate. Repaint with an alkali-resistant paint formulated for the service desired.