



SCOPE

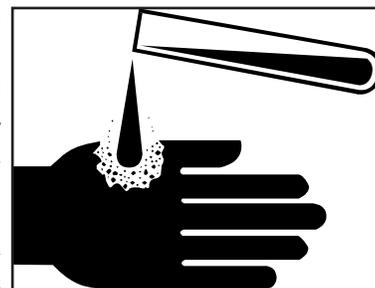
This document provides an in-depth description of the background, research, purpose, and function of the FastFix™ porcelain primer. It serves as a reference to any person wanting to know details about why this product is needed, how it works, and what the expected results are from using it.

IN SEARCH OF BEAUTY

What price for a smile? The general public is willing to go to extraordinary lengths to achieve that perfect smile, and a substantial part of the dental industry has catered to the request. These efforts fall into two basic categories: enhancement of natural teeth, and what we shall call “prosthetics”. We use the term prosthetics here in it’s broader, more general term, “ a device the substitutes or supplements a part of the human body”.¹ These prosthetics can be in the form of implants, caps, crowns, inlays, onlays, bridges, dentures, and veneers. Prosthetics are available in a range of materials, from acrylics to metals to porcelain. Different techniques and compounds are employed depending on the type of material that is used. By far the most popular choice of material is porcelain because it can mimic the natural color and sheen of teeth, and is a hard and durable material. Among the drawbacks of porcelain is that it is a chemically unreactive material, which makes it difficult to glue or bond a porcelain prosthetic to the teeth, bones or other substances. Currently, there is a way to treat the surface of porcelain so that adhesives will stick to it, but this process has a seriously hazardous step - hydrofluoric acid.

DANGEROUS ACID

Hydrofluoric acid (HF) is something that the common person usually doesn’t know much about and doesn’t encounter in everyday life - and with good reason. This acid is one of very few materials that will dissolve glass. Its actually for this reason that hydrofluoric acid is used for porcelain dental work. Porcelain is very similar to glass from a chemistry point of view. The acid is used to dissolve a thin amount of the porcelain, to “chemically roughen” the surface so that other chemical materials will stick to them better. Currently, the process for preparing a porcelain prosthetic for bonding is to



1. Mechanically roughen the surface with a dental bur and/or high-pressure sandblast, then rinse it clean.
2. Chemically roughen the surface by etching with hydrofluoric acid, then rinse it clean.
3. Coat the roughened surface with a substance called silane. This is a chemical that has one part of it that looks and behaves like porcelain, and the other part that forms an acrylic appendage. This substance creates an interface that allows acrylic based dental adhesives to work with porcelain.
4. Apply an acrylic based cement or adhesive, place the prosthetic, and make sure the adhesive is cured.

Without the acid etching step, the silane just doesn't stick very well to the porcelain, and consequently the acrylic adhesives don't work. However, the clinician must be very careful when handling hydrofluoric acid. This substance is poisonous. Immediate contact with skin may lead to severely inflamed sores and burns that don't appear until at least 24 hours after contact. These burns often take a long time to heal. The acid solution can also evolve hydrogen fluoride gas which is extremely irritating to lung tissue - just as it is to skin. Long term exposure to HF can result in fluorosis, with effects such as anemia, teeth discoloration, and osteosclerosis.² This is quite a hazard that the clinician is exposing himself/herself to on a regular basis. The clinician should have a safer option that allows them to continue working with prosthetics without putting them at risk in this manner. We at CAO Group strongly believed in this cause and have provided the answer - FastFix™ porcelain primer.

A SAFER SOLUTION

FastFix™ porcelain primer is a new porcelain surface treatment material that does away with hydrofluoric acid, yet still enables acrylic based adhesives to very effectively bond to the porcelain surface so the restoration still holds fast. CAO Group has discovered an organic acid that roughens the porcelain just as HF does, but this chemical is considerably safer - in fact it's commonly present in the foods we eat. In addition to being safe, this new chemical also allows us to combine the etchant and silane treatment into one material. In the past this wasn't possible because the HF destroys the silane. Our compound won't. That means the list of four steps is now reduced to three.

Of course, it's one thing to just sit here and say its better, but we always back up our claims with proof. A common test used to determine the effectiveness of dental adhesive systems is the shear bond test. In this test, a tooth or porcelain is embedded in acrylic and ground down to an even flat surface with the tooth or porcelain exposed. Next, the desired adhesive systems or procedures are applied to the tooth or porcelain. Finally, acrylic dental composite is bonded to the treated surface - often in the shape of a cylinder for test repeatability. This assembly is then placed in a materials testing machine where a specially designed blade slides down the surface of the tooth/acrylic and pushes against the composite cylinder until it is broken off. The amount of force needed to break it off is measured, and the results are compared to controls and to other adhesive systems. We performed this test with FastFix™ porcelain primer, comparing it to another commonly used porcelain system that use HF. This test used the exact same embedded porcelain and the exact same acrylic composite. Take a look at the results:

FastFix™
41.22 MPa

Competitor
34.32 MPa



Oddly enough, these great bond strengths resulted from a modification to Step #1 of the treatment process previously listed. With FastFix™ it is unnecessary to grit blast the porcelain. Just roughen the surface with a diamond bur. These bonds are so strong that with FastFix™ there's a good chance the porcelain will break before the bond ever does. Fast Fix™ is cleared by the U.S. FDA for conditioning porcelain dental appliances. To top it off, FastFix™ is available to the clinician for as low as \$5.00 per cc through our exclusive distribution partner, Henry Schein®. Factor in the additional costs of hydrofluoric acid all the other systems require, and FastFix™ truly is the lowest cost porcelain bonding system available.

Safer. Stronger. Fewer Steps. Inexpensive. FastFix™ porcelain primer is a superior product on so many levels, all of them with a focus of improving the dentist's quality of care and quality of practice.

References

1. "Prosthetic". *Dictionary.com*.
2. "Hydrofluoric Acid". Merck Index, 13th Edition, Whitehouse Station, NJ, 2001, pg 856.