

Impressed by impression materials

During the 16th biennial European Dental Materials Conference held the 6th September 2001 at the University of Glasgow we presented the test results on Cavex ColorChange by means of a poster.

During the development of Cavex ColorChange many tests were performed in the Cavex R&D laboratory. To substantially found the Cavex statement that Cavex ColorChange has a dimensional stability of 5 days it was essential to check our results by an objective institute like the University of Amsterdam (ACTA). Therefore, the poster is the result of the combined efforts of the University of Amsterdam (ACTA) and Cavex Holland BV. For details we refer to the information underneath.

Clinical Relevance:

In 2001 it was concluded that, thanks to the new formulation of Cavex ColorChange alginate, the reaction mechanism is in balance guaranteeing a complete hardening reaction. Therefore, a dimensional stability of at least 5 days was confirmed, meaning a Cavex ColorChange impression can be stored for at least 5 days without shrinkage, resulting in more time for pouring out, even twice, whatever suits the dentist or the dental laboratory technician best.

Based on the measurements as shown underneath, today we can extend this claim that Cavex ColorChange will remain stable for at least 9 days.

DIMENSIONAL STABILITY OF ALGINATE IMPRESSION MATERIALS

Introduction:

In 2001, Cavex presented the first test results, which showed 5 days dimensional stability for Cavex ColorChange. More than 10 years we used this information to show our customers the high quality and stability of our products.

In the meantime, our Research & Development department worked on improvements of the alginate impression materials. We formed close cooperations with suppliers to understand more the chemistry of the used ingredients and discussed the important characteristics of alginate impression materials with our dealers all over the world. As a result, slight improvements were obtained for the Cavex alginates.

In 2010, we launched a project together with the department Dental Material Science of ACTA (University of Amsterdam). Goal was to make a total evaluation of 6 major brands of alginate impression materials (CAVEX CA37, JELTRATE, AROMA FINE, HYDROGUM, KROMOPAN, COLORCHANGE). The main topics of the research were defined: dimensional stability, compressive strength, density, acidity (pH)

Dimensional Change:

For the dimensional change test we developed a complete new method using laser technology. Samples of the alginate impression materials were prepared (l = 5 cm long Ø 1 cm, n=5). The thickness was measured with a laser scanning microscope. The samples were stored in a hermetically closed plastic bag and measured again after 1 hour, 1 day, 2 days, 5 days and 9 days. The results for absolute (μm) and relatively (%) showed again perfect dimensional stability results for Cavex ColorChange.

Density & Compressive Strength:

In an attempt to explain the good results, the density was measured using a new method from the ISO 1183-1:2012 'Method for determining density'. Alginate samples (n=5) were prepared (h= 20 mm, Ø 40 mm) and tested with this immersion method.

After testing the samples were dried with a paper tissue and used for testing the compressive strength according to the standard ISO1563 for Alginate Impression Material.

Density: There is a clear correlation between the powder/water ratio and the density. A stable density is not an indication that the material is dimensionally stable, probably due to syneresis (the separation of water from the alginate gel) For all materials we can detect a slight increase in density over time. As volume decreases due to slight shrinkage, the density increases.

Compressive strength: For most materials the compressive strength changes during the first hours. After that time it is relatively stable. More dense material will result in slightly higher compressive strength.

Acidity (pH):

The alginate impression materials were mixed according to manufacturer's instructions.

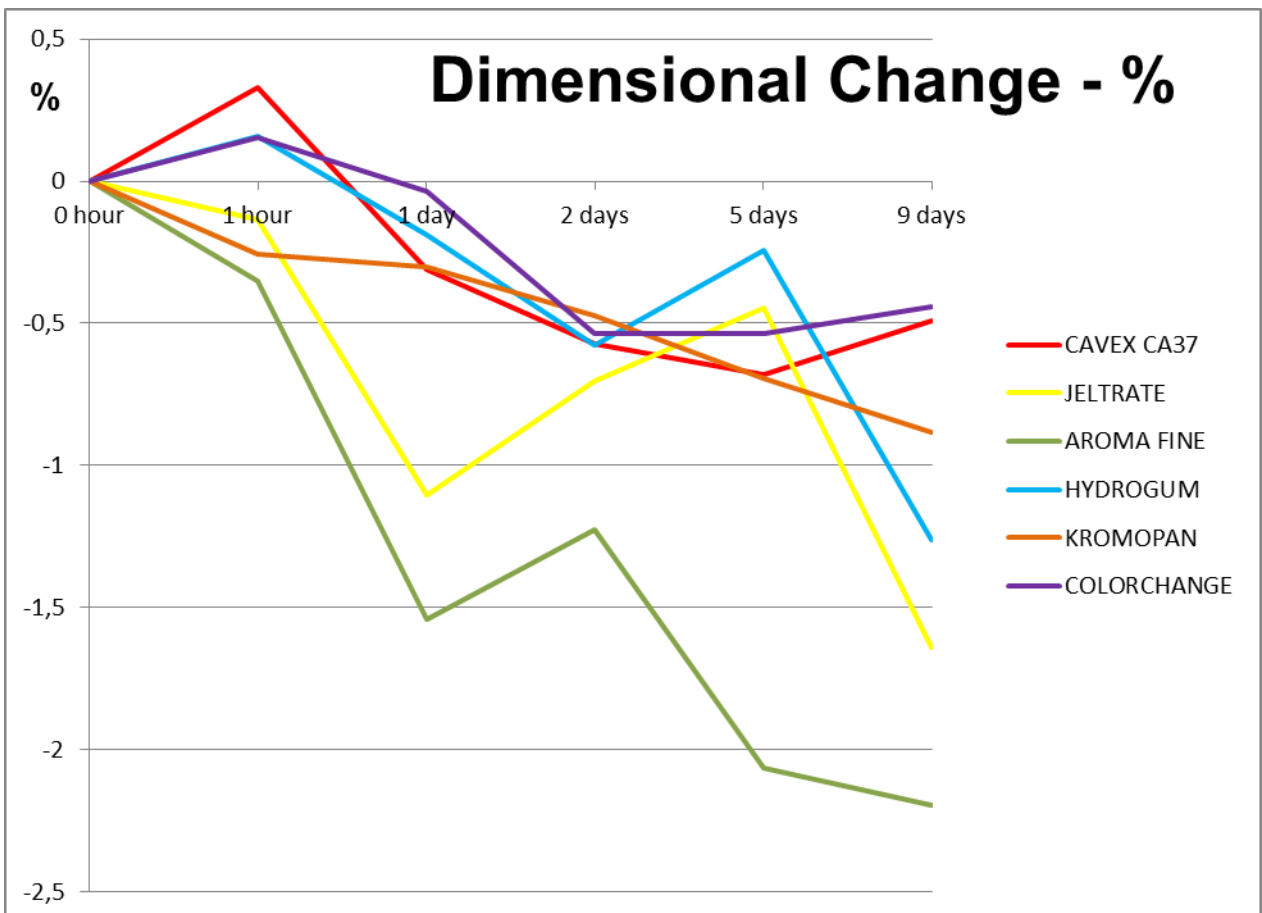
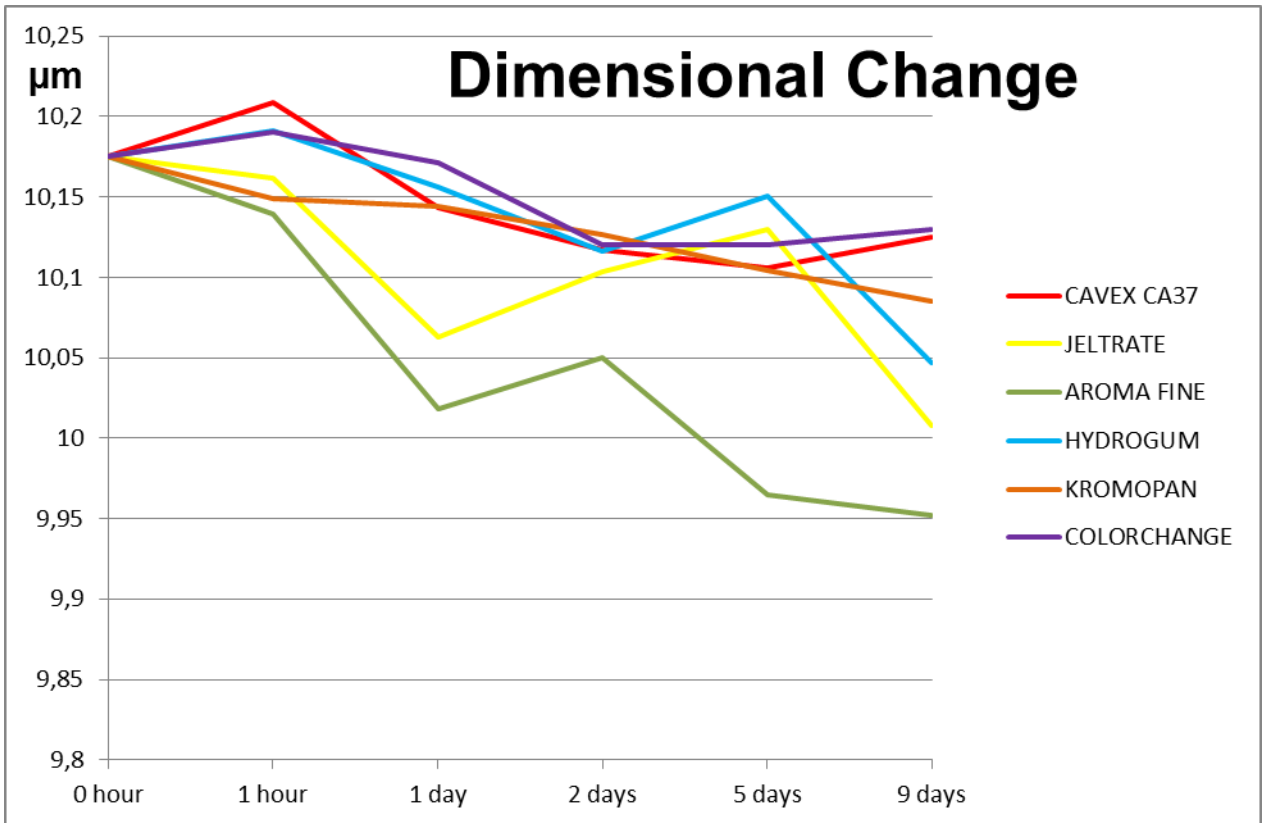
25 ml of the mixed material was transferred into a copper ring placed upon a plastic tray.

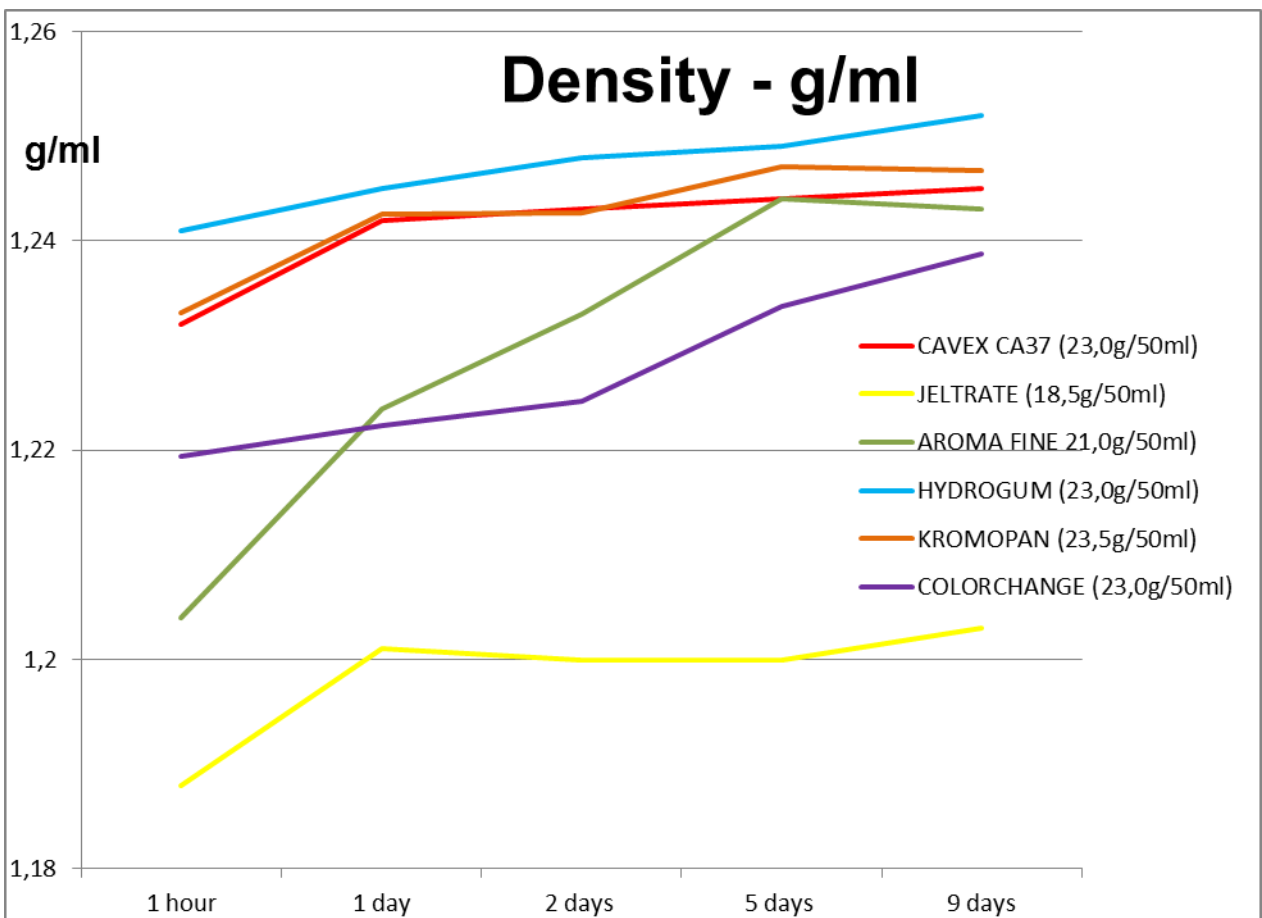
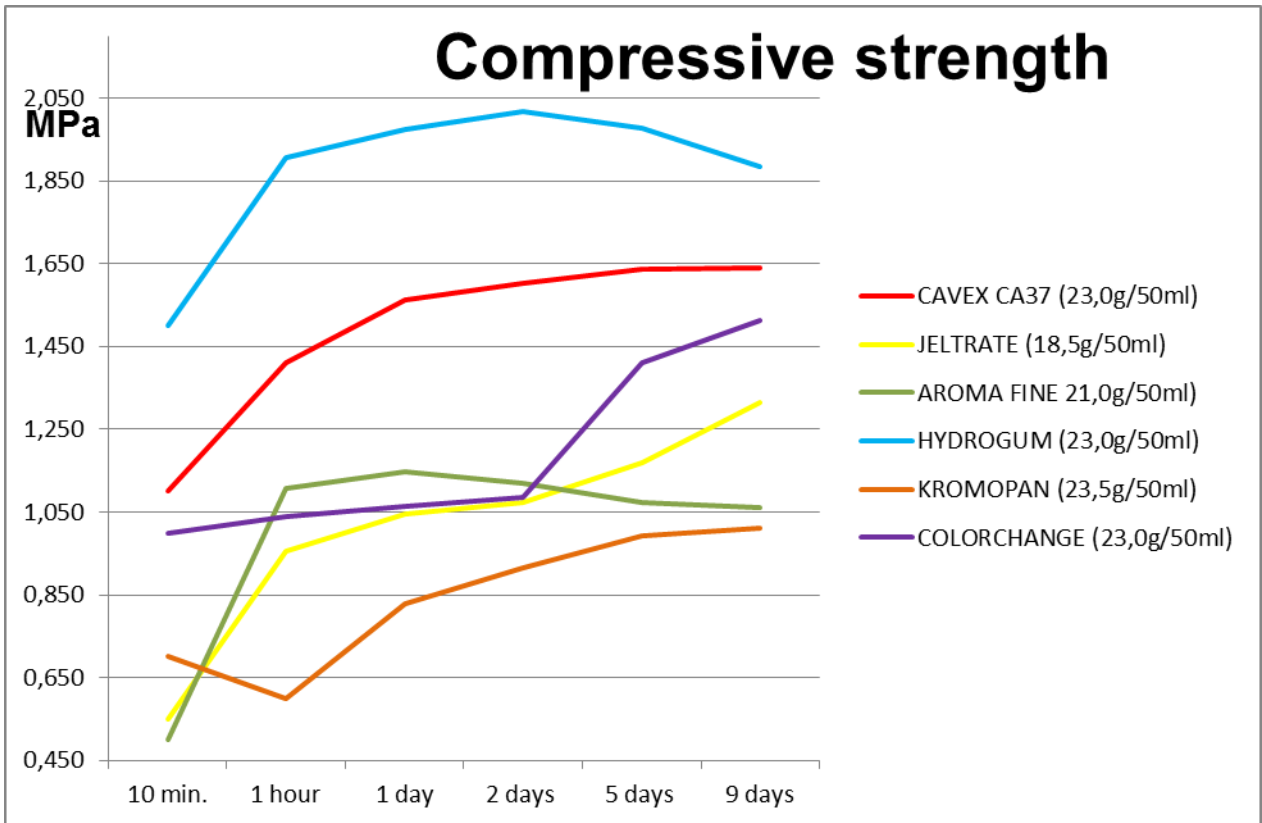
The pH curve was recorded for 50 minutes using a Mettler Delta 350 glass electrode.

There was no significant correlation between dimensional stability and acidity. As the acidity for all materials is still not stable after 50 minutes, we may assume that this is somehow involved in the final stability of the materials. Nevertheless, the acidity is definitely directly related to the setting behaviour of the alginate impression materials.

Clinical Relevance:

As shown in 2001, we can state that the impressions of Cavex ColorChange can be stored for at least 5 days. Today we can extend this claim with these measurements and show that Cavex Colorchange will remain stable for more than 9 days.





Acidity (pH) v/s time

