

Stability of Alginate Materials Over Time as Measured by Detail Reproduction and Compatibility with Gypsum

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Xantasil (Kulzer) is an alginate substitute material that is exceptional in its ability to produce impressions that are stable over an extended period of time. In this study, Xantasil was compared with a popular alginate substitute material, **Alginot** (Kerr Corp.), and a popular alginate, **Jeltrate** (DENTSPLY Caulk).

How is “stability over time” determined? A detail reproduction block (known as a master die), which is highly polished stainless steel and scribed with straight lines, is shown in the image below. Sets of impressions are made of the block surface and stored for four different time periods. At the end of each storage period, the impression is poured in dental stone which is allowed to set for the same period of time for all sets of impressions. The length of the line between the two crossing lines A-B and C-D copied onto the impression material and then the stone die is measured using a traveling microscope to an accuracy of 0.005 mm. The distance on the gypsum die is compared with the certified distance on the master die. A positive value implies that the impression expanded between the two time points, whereas a negative value means the impression shrank over the measured period.

Purpose: To determine stability of several alginate substitute and alginate materials over time.

Experimental Design:

Materials

Alginate substitutes:

Xantasil Fast Set (Kulzer) [Lot #: 400074]

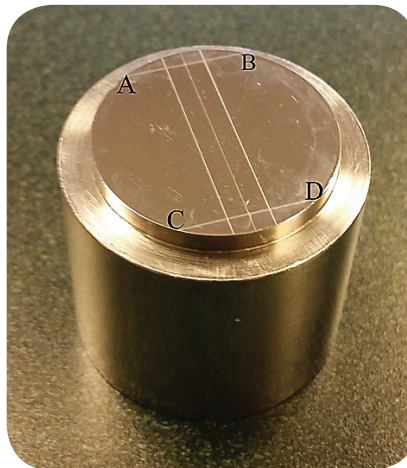
Alginot (Kerr Corp.) [Lot #: 3-1323]

Alginate:

Jeltrate (DENTSPLY Caulk) [Lot #: 140313]

Gypsum:

Die-Keen Green Die Stone (Kulzer) [Lot #: 1404030]



Tests: Compatibility with Gypsum and Reproduction of Detail (ADA Specification # 18-1992, ISO 1563) was determined at 30 minutes, 24 and 48 hours, and 2 weeks after the impression had been taken.

Test Conditions: Gypsum was poured into alginate or alginate substitute impressions of the detail reproduction block at several time points after the initial impression was taken.

Replications: 3 at each time point

Methods:

The alginates were mixed, poured into the die and then stored after being released from the die according to manufacturer's instructions for each of the above noted time periods. Gypsum was poured against each set of impressions at the prescribed time points, allowed to set for the instructed time period and then the transferred die detail was measured with a traveling microscope in compliance with ISO 1563.

Results:

Material	Linear Dimensional Difference* (mm) After:			
	30 mins.	24 hours	48 hours	2 weeks
Xantasil	0.02 (0.10)	-0.05 (0.05)	0.03 (0.04)	0.02 (0.05)
Alginot	0.04 (0.04)	0.00 (0.03)	0.02 (0.03)	-0.02 (0.10)
Jeltrate	-0.32 (0.03)	-0.61 (0.07)	-0.44 (0.11)	(did not reproduce)

*A negative value is shrinkage

Analysis of variance and comparisons of means using Fisher's PLSD at the 0.05 level of significance showed there was a significant difference in dimensional change between Jeltrate and the other two materials; however, there was no significant difference in dimensional change between Xantasil and Alginot.

Conclusions:

- No significant differences in dimensional change were found between **Xantasil** and **Alginot** for each time interval. Both alginate substitute materials were dimensionally stable and accurately reproduced the detail reproduction block over the two-week time period.
- Xantasil and Alginot were both significantly more accurate than **Jeltrate**, which exhibited shrinkage.
- All three materials were compatible with gypsum as measured by reproduction of the 24µm line of the detail reproduction block, with the exception of the **Jeltrate** impression measured at two weeks.



Xantasil Fast Set