



The effect of temperature, humidity, and time on flowability of premixed calcium silicate-based sealer



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Recently, calcium silicate-based sealer (CSS) is becoming more popular in root canal therapy. CSS comes in the form of a pre-mixed root canal sealer. The setting reaction depends on humidity and temperature. Therefore, the storage conditions can influence the properties and shelf life for later use. The purpose of this study is to compare the effect of temperature, humidity, and time on flowability of sealer to extend the period of using a sealer that is still effective and does not adversely affect the root canal.

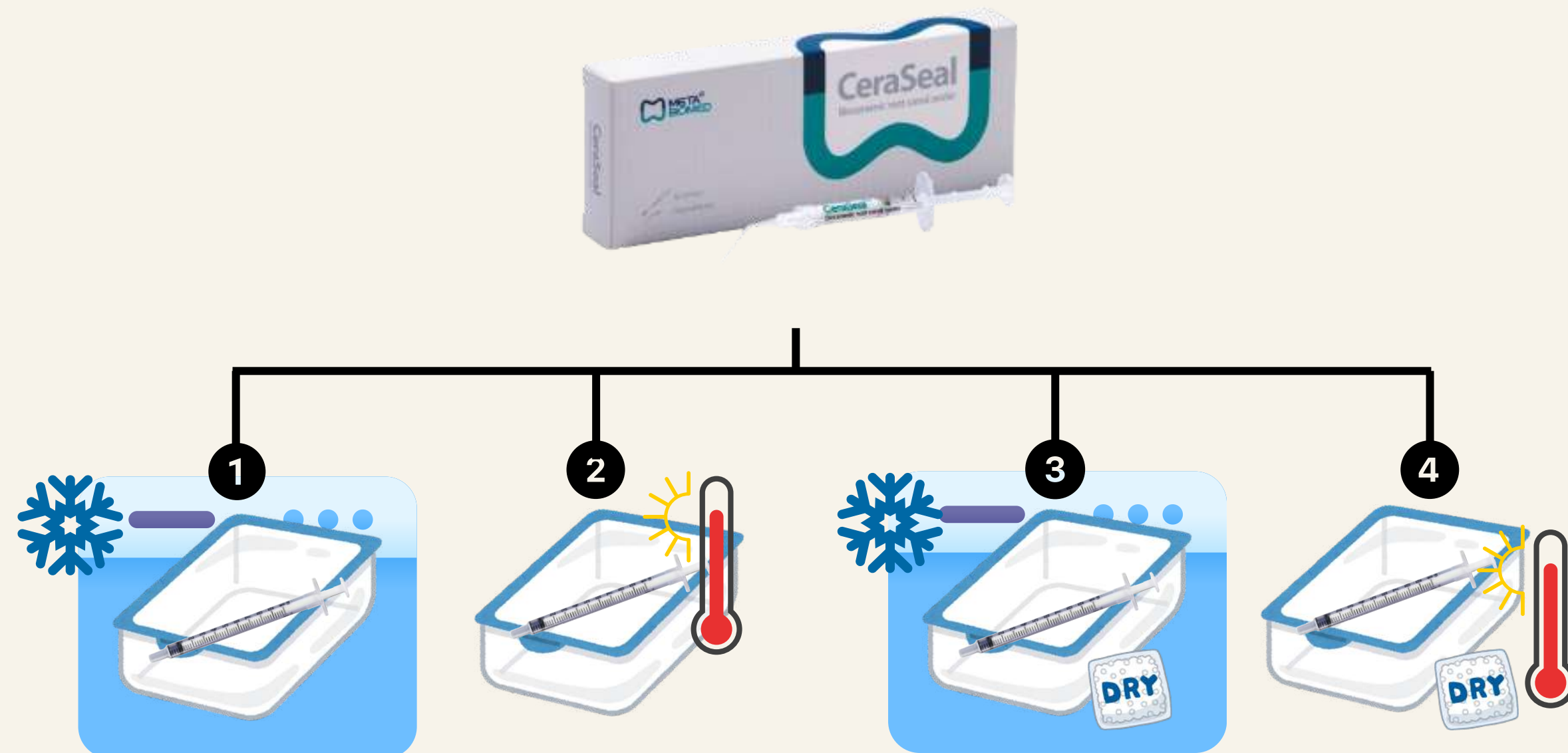
Objective :

- 1.To evaluate the effectiveness of temperature, humidity, and time on flowability of premixed CSS.
- 2.To study appropriate methods of CSS storage and preservation

Flowability measure :

The sealer's flowability will be evaluated according to ISO 6876/2012 standards. A 0.05 ± 0.005 ml of sealer will be applied to the center of a glass plate using a 1-ml syringe. 3 minutes later, a second glass plate (20 g) will be placed on top of the sealer, and a 100-g weight will be put on the top plate. After 10 minutes, the load will be removed, and the sample disk's minimum and maximum diameter will be measured with a ruler. If the disks are not uniformly circular (Maximum and minimum diameters deviating by more than 1 mm.), the test will be repeated.

Method :



KEEP FOR 1, 7, 30 AND 90 DAYS

GROUP 1 UNCONTROLLED HUMIDITY (RELATIVE HUMIDITY 20–30%) IN REFRIGERATOR (4 °C).

GROUP 2 UNCONTROLLED HUMIDITY (RELATIVE HUMIDITY 20–30%) AT A ROOM TEMPERATURE (37 °C).

GROUP 3 CONTROLLED RELATIVE HUMIDITY OF 10% IN REFRIGERATOR (4 °C).

IN GROUP 4 CONTROLLED RELATIVE HUMIDITY OF 10% AT A ROOM TEMPERATURE (37 °C).

Statistical analysis :

ANOVA will be used to analyze the variance of the data

↓
p<0.05 --> ANOVA is significant

Post-hoc tests will be used to identify specific group differences.

Results :

| Condition | 0 day | 1 day | 7 days | 30 days | 90 days |
|--------------------------------|---------------------|-----------------------------|-------------------------------|-------------------------------|----------------------------------|
| Uncontrolled moisture at 4 °C | 25 | 22.5±4.82 | 23±0.50 | 23.5±1.50 | 21.5±0.50 ^{A,B,D} |
| Uncontrolled moisture at 37 °C | 25 ¹ | 21.3333±2.30 | 23.3333±0.58 ² | 23±2.18 ³ | 18.5±0.87 ^{B,C,D,1,2,3} |
| Controlled moisture at 4 °C | 25 ^{1,3,4} | 24.8333±0.76 ^{2,4} | 22.6667±0.58 ^{1,2,3} | 22.6667±0.29 ^{1,2,4} | 21.5±0.50 ^{A,B,C,1,2} |
| Controlled moisture at 37 °C | 25 ¹ | 19.3333±1.61 ¹ | 22.3333±0.58 ² | 22±0.87 ³ | 18.5±1.50 ^{A,C,D,1,2,3} |

• 1, 2, 3, 4 SUPERScript LETTERS INDICATE HORIZONTAL STATISTICAL SIGNIFICANCE.
• A, B, C, D SUPERScript LETTERS INDICATES VERTICAL STATISTICAL SIGNIFICANCE.

Conclusion :

- The temperature and time effect flowability of CeraSeal.
- Higher temperature results in less flowability because it stimulates the sealer setting reaction but if the temperature is not excessively high, the flowability of the sealer is still acceptable
- There was no difference in flowability between samples stored with humidity control and those without.
- CeraSeal should be used up within 3 months, otherwise the sealer tend to have its flowability lower than ISO 6876/2012.

Keywords :

Calcium silicate-based sealer, Premixed calcium silicate-based sealer, Flowability, Storage

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