

### INTRODUCTION

The traditional zinc oxide-eugenol or non-eugenol cements have been widely used due to their good biocompatibility and excellent sealing characteristics. Unfortunately, these materials have low optical characteristics and are very opaque in appearance. When an opaque temporary cement is used to cement temporary restorations made of sufficiently transparent materials, e.g., porcelain or resin composites, the shade of the temporaries can be greatly affected by showing-through of the temporary cement. Recently, resin cements have been used in temporary restoration. They have advantages in mechanical and optical properties. However, the temporaries with the resin based cements may have difficulties in removing after placing and curing the cements due to their high bond strengths. Therefore, resin based cement is required to be strong enough to retain the restoration yet allow easy removal of the restoration when needed.

### OBJECTIVE

The purpose of this study was to evaluate the physical properties of resin-based, zinc oxide/eugenol, and non-eugenol temporary cements.

### MATERIALS

Experimental (EXP, Kerr) LN 484TC66B  
 Tempbond Clear (TBC, Kerr) LN 450779  
 Embonte (EMB, Dux) LN 062167  
 Tempbond NE (TBN, Kerr) LN 6-1031  
 TempoCem NE (TCN, DMG) LN544400

### METHOD

**Bonding Strength (BS):**  
 For bonding strength to human dentin a precured knob made of a temporary crown and bridge material Tempphase (Kerr) in a cylindrical mold (D=3.1mm, H=4mm) was bonded to the dentin with a temporary cement. Six specimens were stored at condition 37 °C for 24 hours and then subject to shear force on an Instron mechanical tester.

**Shore D hardness (SD):**  
 Three specimens per group were prepared by extruding each material and mixing through a static mixer into a stainless steel mold (D=10mm, H=1mm). The sample was allowed to cure for 1hr prior to testing. The hardness measurements were made using a Shore D Durometer according to ASTM D2240.

**Film Thickness (FT):**  
 Five specimens per group were prepared by extruding each material onto a glass plate (14 x 14 x 1mm). The material was covered with the paired mapped glass plate and sandwiched between flat stainless steel blocks. The assembly was placed in Rockwell tester for 10 minutes. Film thickness was tested according to ISO 6876 standard.

**Data Analysis:**  
 Statistical analysis was performed using one way ANOVA and Bonferroni's method for pair-wise comparison to determine significant differences among group ( p<0.05)



Figure 1. Shear Bond Test Set-Up Without Sample

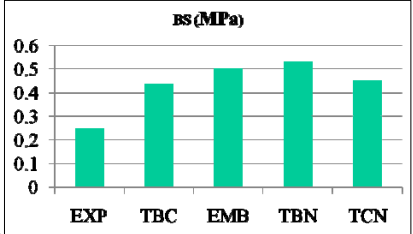
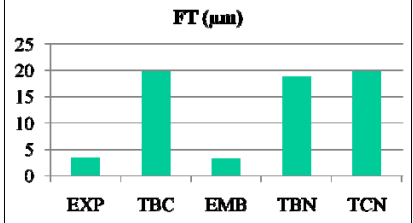
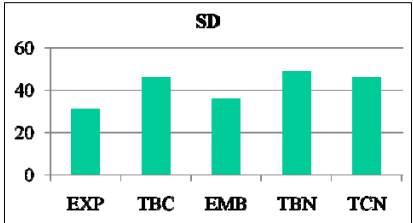


Figure 2. Shear Bond Test Set-Up During Test

### RESULTS

	EXP	TBC	EMB	TBN	TCN
<b>SD</b>	31 ± 0 <sup>a</sup>	46 ± 1 <sup>c</sup>	36 ± 2 <sup>b</sup>	49 ± 0 <sup>c</sup>	46 ± 2 <sup>c</sup>
<b>FT (µm)</b>	3.4 ± 2 <sup>a</sup>	19.8 ± 5 <sup>b</sup>	3.3 ± 1 <sup>a</sup>	18.9 ± 6 <sup>b</sup>	19.7 ± 6 <sup>b</sup>
<b>BS (MPa)</b>	0.25 ± 0.11 <sup>a</sup>	0.44 ± 0.4 <sup>a,b</sup>	0.50 ± 0.21 <sup>b</sup>	0.53 ± 0.1 <sup>b</sup>	0.45 ± 0.04 <sup>b</sup>

\* Means with the same letter are not statistically different at p<0.05



### DISCUSSION

ANOVA analysis (p<0.05) of the test data showed that EXP had the lowest Shore D hardness value among all materials tested, indicating that EXP was much softer than the rest of the materials. The film thickness of EXP and EMB was significantly lower than that of the other materials tested. The thin film thickness benefits the optimum fit of the temporary restoration. In addition, EXP had the lowest bonding strength compared to TBC, EMB, TBN and TCN. TBC had no significant differences in bonding strength compared to EMB, TBN and TCN test materials due to the large standard deviation. The low bonding strength of EXP may be attributed to the characteristics of the soft elastomeric polymer material.

### CONCLUSION

The experimental material is a softer material and is weaker in bonding to the dentin surface, thus leading to lower retention of the temporaries and allowing for easy removal.