

Paper: Polymerization Shrinkage and Contraction Stress of an Experimental Composite (AADR Annual Meeting (March 3-6, 2010))



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1024 Polymerization Shrinkage and Contraction Stress of an Experimental Composite

Friday, March 5, 2010: 3:30 p.m. - 4:45 p.m.

Location: Exhibit Hall D (Walter E. Washington Convention Center)

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Polymerization Shrinkage and Contraction Stress of an Experimental Composite

Objective: Minimizing polymerization shrinkage and related stress remains an active pursuit. An experimental resin-matrix composite utilizing a new monomer resin, DX-511 (Dupont), was evaluated. Methods: The experimental material (Kalore) was formulated and supplied by GC Corporation. Volumetric polymerization shrinkage (VPS) and polymerization contraction stress (PCS) were evaluated for the experimental and four commercially available materials. VPS was determined using density bottles and unpolymerized/polymerized specimens and weights determined to the nearest 0.0001 gm (n=3). Measurements were obtained for initial, 1 day and 7 day time periods. PCS, maximum stress rate and gel point were determined with a tensometer (n=5). Specimens were light cured for 60 seconds and polymerization data collected for 60 minutes. Data were evaluated using one-way ANOVA for each parameter or time period. Results: The results are given in the Table. All superscript letters indicate statistically similar groups in each column: p<0.001 for PVS and p<0.01 for all other columns.

	PCS (MPa)	Max Stress		Initial	VPS (%)	
		Rate (MPa/min)	Gel Point (mins)		1 Day	7 Days
-	-	-	0.13 ±			
Kalore (GC)	1.72 ± 0.10 <sup>a</sup>	2.80 ± 0.71 <sup>a</sup>	0.02 <sup>a</sup>	0.92 ± 0.21 <sup>a</sup>	0.55 ± 0.29 <sup>a</sup>	0.23 <sup>a</sup>
Filtek Supreme Plus (3M ESPE)	2.61 ± 0.26 <sup>b</sup>	5.62 ± 0.99 <sup>b,c</sup>	0.13 ±	2.82 ± 0.19 <sup>c</sup>	2.05 ± 0.23 <sup>c</sup>	2.52 ±
EsthetX HD (Caulk Dentsply)	3.10 ± 0.13 <sup>c</sup>	6.62 ± 0.42 <sup>c,d</sup>	0.10 ±	2.71 ± 0.34 <sup>c</sup>	2.45 ± 0.56 <sup>c</sup>	2.20 ±
Premise (Kerr)	2.39 ± 0.17 <sup>b</sup>	7.48 ± 0.71 <sup>d</sup>	0.13 <sup>a</sup>	1.87 ± 0.30 <sup>b</sup>	1.20 ± 0.26 <sup>b</sup>	2.14 ±
TPH3 (Caulk Dentsply)	3.07 ± 0.15 <sup>c</sup>	9.08 ± 1.11 <sup>e</sup>	0.12 ±	3.48 ± 0.24 <sup>d</sup>	3.10 ± 0.29 <sup>d</sup>	2.99 ±
			0.01 <sup>a</sup>			0.36 <sup>c</sup>

Conclusions: The experimental material showed lower VPS and PCS than the evaluated commercial products.

Partially supported by GC America.

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