Degree of monomer conversion in dual cure resin-based dental cements material

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DEGREE OF CONVERSION

FTIR ANALYSIS

Infrared spectroscopy with Fourier transform (FT-IC) was used to determine the degree of monomer-to-polymer conversion in dual cure cements based on composite resins.

Two materials from the group of resin-based dual cure cements were analyzed (Variolink II and RelyX ARC, 10 samples of each material).

After preparation, the samples were stored in a water bath at 37 ° C for 24 hours, after which FT-IC spectrophotometer was used to record the spectra at wavelengths ranging from 400 to 4000 cm-1as a means of establishing the degree of cementitious material polymerization.

DUAL CURE COMPOSITE RESIN BASED DENTAL MATERIAL

Variolink II

RelyX ARC

RESIN BASED DENTAL MATERIALS

-DEGREE OF CONVERSION-

The degree of monomer-to-polymer conversion is an important characteristic of dental materials based on composite resins used in tooth restoration as well as for the permanent bonding of crowns, bridges and fiber posts.

Available data indicate that 100% polymerization of composite resin-based materials is not attainable in practice, which leads to inferior mechanical properties of the material, as well as a weaker bond strength between the restorative material and the tooth structure.

In addition, unreacted monomer leaching has potential biological implications, especially in the case of triethylene glycol dimethacrylate (TEGDMA), which has been shown to cause DNA changes in mammalian cells. Unreacted monomer can also stimulate bacterial growth in the immediate vicinity of the restoration and cause allergic reactions in some patients.

CONCLUSION

The tested materials showed a satisfactory degree of polymerization, which was influenced by the chemical structure of the cementitious material in terms of the presence of a dominant organic resinous matrix. Cement material based on TEGDMA organic resin matrix exhibits a significantly higher degree of monomer-to-polymer conversion.

RESULTS

VARIOLINK II

69.18%-98.74%

RELYX ARC

.30.6%-97.92%