World Academy of Science, Engineering and Technology
International Journal of Chemical and Materials Engineering
Vol:9, No:01, 2015

Correlation Volumic Shrinkage, Conversion Degree of Dental Composites

Authors : A. Amirouche, M. Mouzali, D. C. Watts

Abstract : During polymerization of dental composites, the volumic shrinkage is related to the conversion degree. The variation of the volumic shrinkage (S max according to the degree of conversion CD.), was examined for the experimental composites: (BisGMA/TEGDMA): (50/50), (75/25), (25/75) mixed with seven radiopac fillers: La2O3, BaO, BaSO4, SrO, ZrO2 , SrZrO3 and BaZrO 3 with different contents in weight, from 0 to 80%. We notice that whatever the filler and the composition in monomers, Smax increases with the increase in CD. This variation is, linear in particular in the case of the fillers containing only one heavy metal, and that whatever the composition in monomers. For a given salt, the increase of BisGMA composition leads to significant increase of S max more pronounced than the increase in CD. The variation of ratio (S max / CD.) with the increase of filler content is negligible. However the fillers containing two types of heavy metals have more effect on the volumic shrinkage than on the degree of conversion. Whatever the composition in monomer, and the content of filler containing only one heavy atom, S max increases with the increase in CD. Nevertheless, S max is affected by the viscosity of the medium compared with CD. For high percentages of mineral fillers (≥ 70% in weight), the diagrams S max according to CD are deviated of the linearity, owing to the fact that S max is affected by the high percentage of fillers compared with CD. The number of heavy atoms influences directly correlation (S max / CD.). In the case of the two mineral fillers: SrZrO3 and BaZrO3 ratio (S max / CD) moves away from the proportionality. The linearity of the diagrams Smax according to CD is less regular, due to the viscosity of high content of BisGMA. The study of Smax and DC of four commercial composites are presented and compared to elaborate experimental composites.

Keywords : Dental composites, degree of conversion, volumic shrinkage, photopolymerization
Conference Title : ICMCE 2015 : International Conference on Materials and Chemical Engineering
Conference Location : Jeddah, Saudi Arabia
Conference Dates : January 26-27, 2015