

# Leached components from dental composites in oral simulating fluids and the resultant composite strengths.

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## Abstract

The aim of this study was to analyse the leached moieties of [dental composites](#) after storage in [ethanol](#) and [organic acids](#) of plaque and further evaluate the resultant effect on the diametral tensile strength (DTS) of the composites. Three commercial composites were used: Bis-GMA-based Z100, Bis-GMA/UDMA-based Heliomolar, and Bis-MPEPP-based Marathon One. The [solutions](#) used were: 99.9% [acetic acid](#), 99% [propionic acid](#) and 75% [ethanol](#). Specimens (4 mm diam. x 2 mm thick) were stored at 37 degrees C in 3 mL of [solution](#) for up to 30 days. [Gas chromatography/mass spectrometry](#) was used to characterize the leached moieties and DTS of the specimens after immersion was evaluated. Data were analysed using [ANOVA](#) and Tukey [LSD](#) test. The eluted substances were not all the same in different [solutions](#) and composites but mostly increased with immersion time, and included diluents (TEGDMA and decamethacrylate) and some additives, such as an [ultra-violet](#) stabilizer (TINUVINP), [plasticizers](#) (dicyclohexyl [phthalate](#) and [bis\(2-ethylhexyl\) phthalate](#)), initiator (triphenyl stibine), coupling agent (gamma-methacryloxypropyl trimethoxysilane), and [phenyl benzoate](#). The chief polymerizing [monomers](#) were not found. More kinds of components were found in the [acetic acid](#) and [ethanol](#) groups studied. The fewest kinds and quantities of leached moieties were found for Bis-GMA specimens and then Bis-GMA/UDMA ones, most of which are diluent agents. Bis-MPEPP specimens leached the most substances, which were composed mostly of a short [phenyl group](#) chain structure. The BisGMA composite showed the highest DTS (54.8 +/- 5.7 MPa), which was not greatly affected by the length of storage. Bis-GMA/UDMA (36.2 +/- 6.8 MPa) and Bis-MPEPP (26.1 +/- 4.5 MPa) composites were significantly reduced ( $P < 0.05$ ) after 30 days storage in the [ethanol](#) (35-50%), in the [propionic acid](#) (25-30%), and in the [acetic acid](#) (40-60%). Irreversible processes such as the leaching of components occur in fluids simulating an oral environment, which may contribute to irreversible material degradation, especially for non-Bis-GMA-based composites.