

# Detection of Leached Moieties from Dental Composites in Fluids Simulating Food and Saliva

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## Abstract

**OBJECTIVES:** The purpose of this study was to analyze the IR spectra of a liquid simulating food and an artificial saliva following exposure to resin composites. **METHODS:** Fourier transform infrared (FTIR) spectroscopy was used to analyze two solutions in which three commercially available dental composites (Marathon One, Den-Mat Co.; Z100, 3M Co.; Herculite XRV, Kerr Co.) were stored. The solutions used were: a food simulating fluid, 75 vol% ethanol/water, and an artificial saliva, Moi-Stir (Kingwood Labs., Inc.). Specimens (4.3 mm diam. X 2 mm thick) of the three resin composites were stored at 37 degrees C in 60 mL of either Moi-Stir or the 75% ethanol solution for 7, 14, and 30 d. The FTIR spectra were obtained using a liquid sample ATR (attenuated total reflection) cell. **RESULTS:** No obvious leachable materials were seen from any of the composite specimens stored in artificial saliva up to 30 d of immersion. For the composites stored in ethanol, the observed spectra revealed increases in the principal absorption bands for the components of the three composite systems. Methacrylate skeletal vibrations (1015-815  $\text{cm}^{-1}$ ) and -CH<sub>3</sub> alkane, C-H asymmetrical deformation vibrations (1520-1460  $\text{cm}^{-1}$ ) appeared after 14 d of storage. A very strong peak characteristic of the aliphatic C=C moiety (1640  $\text{cm}^{-1}$ ) and carbonyl C=O (1730  $\text{cm}^{-1}$ ) occurred after 14 d. The peak heights of these two functional bands increased as a function of time and after 30 d of storage were approximately 5-7 times those produced after 7 d. Irregular O-H bands (3500-3300  $\text{cm}^{-1}$ ) were also observed after 30 d in ethanol. **SIGNIFICANCE:** Irreversible processes such as the leaching of components occurs in the presence of ethanol. This phenomenon may contribute to irreversible material degradation.