



PalaXtreme® denture acrylic

Fracture toughness – University of Erlangen-Nuremberg

Fracture toughness measurement of denture acrylics

Residual monomer content

Determination of residual monomer content in denture acrylics

In everyday life, dentures are exposed to considerable stress and not seldom fracture-endangered. To reduce the fracture susceptibility of dentures, denture base materials with improved impact strength, known as “high-impact” materials, were developed. However, during the fabrication of a denture, unreacted monomers usually remain in the acrylic as residual monomers and can adversely affect both the mechanical properties and the biocompatibility of a denture. So far, heat-curing polymers have always been associated with a lower residual monomer content than cold-curing polymers. Meanwhile on the market available modern auto-polymerizing acrylics and not only can keep up with heat-curing polymers in terms of their mechanical properties, but also have reduced residual monomer content.

The present *in-vitro* investigations confirm PalaXtreme “high impact” properties and a particularly low residual monomer content.

Giving a hand to oral health.



KULZER
MITSUI CHEMICALS GROUP

Fracture toughness – University of Erlangen-Nuremberg

Fracture toughness measurement of denture acrylics

Objective

Aim of the *in-vitro* study was the examination of fracture toughness and fracture work of four different cold-curing denture base materials.

Materials and methods

Standardized specimens (n = 15) were fabricated from four different denture base materials (two conventional, two so-called high-impact materials) and a defined central notch was introduced into each specimen. Three-point bending testing was carried out with the universal testing machine at a crosshead speed of 1 mm/min. Fracture toughness and work of fracture were calculated according to ISO 20795. Fracture toughness describes the ability of a material to withstand crack propagation. Work of fracture represents the energy needed to fracture a specimen.

Results and conclusion

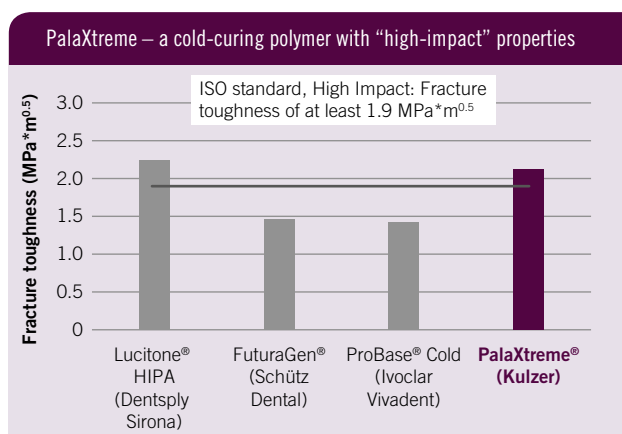


Fig. 1: Average fracture toughness [MPa*m^{0.5}] of the denture base materials tested.

The two cold-curing denture base materials Lucitone HIPA and PalaXtreme meet the ISO standard requirements concerning fracture toughness (fig. 1) and work of fracture for materials with improved impact strength (known as high-impact materials). FuturaGen and ProBase Cold, two conventional materials, are well below the threshold values for materials with improved impact strength. Materials with improved impact strength can better resist the propagation of cracks and are considered less susceptible to fracture.

Source

University of Erlangen-Nuremberg 2018 test report. Unpublished data. Documentation available. The report was summarised. The figures and heading were created by Kulzer.

Residual monomer content

Determination of residual monomer content in denture acrylics

Objective

The objective of the *in-vitro* investigation was to determine the residual monomer content of four different cold-curing denture base materials.

Materials and methods

From four different denture base materials (two conventional, two so-called high-impact materials), standardised specimens were prepared. Methyl methacrylate monomer (MMA) was extracted from the polymerised test specimens and analysed using the gas chromatographic analysis method.

Results and conclusion

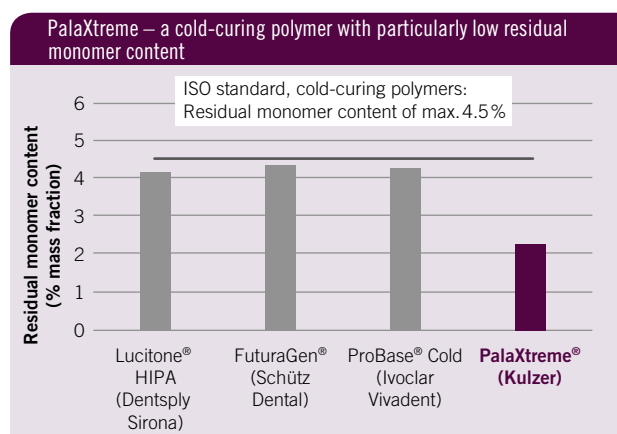


Fig. 1: Mean residual monomer content (% mass fraction) of the denture base materials tested.

All cold-curing denture base materials tested had a residual monomer content below 4.5% (fig. 1). **This is the only one of the materials tested to be well below the required values.** A low residual monomer content of the denture base acrylic can increase the biocompatibility of the denture and provide a reduced allergy potential.

Source

Research & Development, Kulzer Wehrheim, unpublished data. Documentation available.