428i Polymeric Biomaterials: Compatibility of Medical-Grade Polymers with Dense CO2

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Polymeric biomaterials must be cleaned and sterilized prior to use in any invasive medical procedure. This must be done without damaging to the surface or bulk properties, and without compromising biocompatibility. A new, low temperature sterilization process based on liquid carbon dioxide (CO2) technology has been proposed, and therefore this study investigates the effect of liquid CO2 on the mechanical properties of selected medical polymers and adhesives. The lap shear strength of three adhesives and the tensile strength and modulus of eighteen polymers are reported. Materials were exposed to CO2 at 6.5 MPa and ambient temperature. Additionally, some polymers were processed with aqueous H2O2 mixed with CO2. Carbon dioxide uptake, swelling, and distortion were observed for the more amorphous polymers while crystalline polymers showed much less effect on CO2. Changes in tensile strength were not statistically significant for most plastics, and most indicated good tolerance to liquid CO2.