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Comparative Studies on Fracture Characteristics of Food Gels Subjected to Uniaxial Compression and Torsion

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Stress developments in cylindrically shaped food gels were comparatively investigated by applying uniaxial compression and torsional deformation up to fracture. While torsion tended to result in earlier fracture with lower fracture stress and strain values, the true shear stress vs. true shear strain curves determined based on uniaxial compression and torsion tests were in good agreement up to the point of fracture in torsion in most cases examined. A typical fracture plane was observed at an angle approximately $\pi/4$ radians with respect to the cylinder axis in both uniaxial compression and torsion, suggesting that those compressed and twisted gels fractured in shear and tension, respectively. Both fracture stress and strain values increased with increasing deformation rate, regardless of the mode of deformation. The present results confirm that torsion can be used for fundamentally assessing fracture characteristics of a material that deforms and/or fractures in an unpredictable manner under uniaxial compression.

Keywords: [texture](#), [fracture stress](#), [fracture strain](#), [compression](#), [tension](#), [torsion](#), [gel](#)

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