

Abstract Submitted  
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**Entanglement swelling in polymer glasses**<sup>1</sup> JOSHUA MCGRAW,  
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house Institute for Materials Research, McMaster University, Hamilton, ON,  
Canada, L8S 4M1 — A polymer system in which the chains are much longer than  
the entanglement molecular weight is well entangled. When a glassy polymer film  
composed of such chains is uniaxially strained, deformations called crazes may be  
formed. It is well established that the study of crazes can reveal much about the  
nature of entanglements. Here, we present results of crazing experiments in which  
well entangled polystyrene networks have been diluted with various weight fractions  
of polystyrene with molecular weights in the vicinity of the entanglement molecular  
weight. Upon dilution, the systems assume an effective reduction in the entangle-  
ment density which is a function of both the weight fraction and molecular weight  
of the small chains. A model which combines simple “chain packing” with “binary  
contact” ideas is proposed. The model is found to quantitatively describe measure-  
ments in systems with two and three molecular weight components, and can easily  
be extended to polydisperse systems.

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