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Swelling Behavior of Crosslinked Rubber: Does the Peak in Dilational Modulus Exist?¹ BEN XU, XIAOJUN DI, GREGORY B. MCKENNA, Department of Chemical Engineering, Texas Tech University — Previous work² has shown that when handled properly, Frenkel³-Flory-Rehner⁴(FFR) theory is an excellent model to explain swelling behavior with the exception of failing to describe the peak of the swelling activity parameter S , or dilational modulus. This peak was first observed by Gee et al.⁵ and has eluded explanations. In the present work, we explored the importance of fitting procedure to the isopiestic data on the presence of the peak of S . We found the peak in S disappears when using a FFR model based fit instead of the empirical or polynomial fits used previously. We take model material parameters and show that adding less than 1% random error to the theoretical curves can lead to the peak in S . Our findings suggest strongly that the “peak” in S is due to experimental errors that are amplified by the fitting method.

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