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# Thermosensitive behavior of hydrophobically associating anionic guar gum solutions and gels

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**Abstract:** Herein, we describe the syntheses of novel thermoassociating anionic guar gums (TGGs) with long aliphatic and polyethylene glycol (PEG) segments and characterize these gums by Fourier transform infrared spectroscopy and $^{1}$H nuclear magnetic resonance spectroscopy. Additionally, we explore the properties of TGG solutions and gels by viscometry, dynamic light scattering, fluorescence spectroscopy, and rheometry, revealing the thermoresponsive behavior of these systems. Thus, TGG solution viscosity increases with decreasing PEG segment length below 35 °C, with an opposite trend observed at 60 °C. Similarly, the critical association concentration increases with increasing PEG segment length at room temperature, with an opposite dependence detected at 50 °C. High temperature results in almost complete hydrophobization of PEG segments, endowing TGG solutions with unique thermoassociating behavior. Moreover, TGG gels feature both coordination and physical crosslinking, with the latter enhanced by increased hydrophobic group length, and therefore exhibit viscosities much higher than that of the parent sulfo-hydroxypropyl guar gum (SHG) gel. The storage moduli of TGG gels reach their maxima with increasing temperature. Additionally, the addition of NaCl increases the viscosities of TGG gels to maximum values exceeding that of the SHG gel.

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