

Petroleum Engineering

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Flow assurance in pipelines - Dealing with non-Newtonian fluids

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In this study, rheological properties of heavy crude oil from mature fields of India are premeditated. Effects of pressure and shear on viscosity followed by viscoelastic properties such as gelation point, crossover amplitude, and crossover frequency are profoundly studied by carrying out constant shear, frequency, strain and temperature sweep experiments on High Pressure Anton Paar Rheometer. Gelation temperature appraises about the ambient temperature to maintain inside the pipelines for flow assurance i.e. just above the gelation point so as to avoid the formation of wax/gel which can lead to blockage of pipe and even shut down in extreme conditions. Storage and Loss modulus are stress responses for a viscoelastic fluid under oscillatory shear. Important feature of temperature vs. G' and G'' is the crossover point, which is the temperature at which G' and G'' intersect (in case of reactive media) or there is a sudden increase in the value of G' (in the case of non-reactive media). At crossover point gel formation takes place and with further decrease in temperature the microstructure tends towards a solid structure. While as temperature increases from crossover temperature, $G'' > G'$ this is the instant when the applied mechanical force surpasses the inter-molecular forces and the material starts to flow. Viscoelastic measurements characterizes material similar to optical spectrum, UV & IR Radiation having the advantage over latter of very less sample requirement and satisfactory results acquired in small deformations.

Biography

Arunima Saxena is in the final year of undergraduate program in Chemical Engineering from S V National Institute of Technology, India. She is a prospective PhD candidate. She has been awarded Mitacs Globalink and Indian Academy of Sciences scholarship.

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