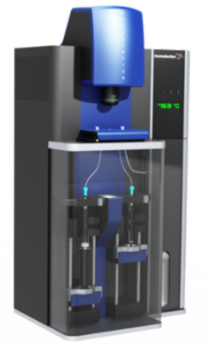
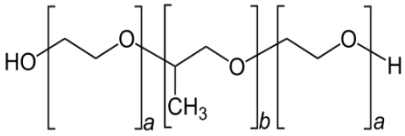
Fast temperature screening for precise viscosity determination of Bio Triblock Polymers



Introduction

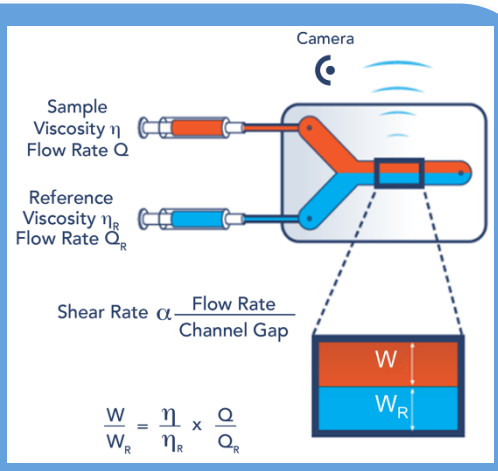
Viscosity is an essential physical property when studying fluid behaviors. However rheological studies are still a challenging task for many laboratories as traditional techniques are time consuming and do not allow for samples to be measured in desired conditions. FLUIDICAM RHEO allows to measure viscosity as a function of shear rate and temperature in a single experimental setup.



Multi-block copolymers provide a wide range of tunable behavior. Here, bio triblock copolymers (Poloxamers - *(PEO)x(PPO)y(PEO)x*) are studied. They are well known for their reversible phase transitions (sol-gel) under specific thermal conditions and thus they are good candidates for innovative drug delivery systems. In this paper, a solution of **F127** (Central Block of Mw=3600 g/mol and 70% of PEO) and **F68** (Central Block of Mw=1800 g/mol and 80% of PEO) was used to demonstrate FLUIDICAM RHEO capabilities.

Reminder on the technique

FLUIDICAM RHEO uses a co-flow microfluidic principle to measure viscosity of various products. A sample and viscosity standard are introduced together in the microfluidic channel (typically 2.2mm X 150µm) where they undergo strong confinement. Applied shear rate is simply adjusted by a computer-controlled syringe pump. Under these conditions, the interface position is related to the viscosity ratio between the sample and the reference. Images of the resulting laminar flow are acquired thanks to an integrated camera and the viscosity of the sample is automatically extracted as a function of shear rate and plotted directly in the software giving a resulting rheological curve.



Experimental results

A 90:10 F127 – F68 solution was used to prepare two solutions of total polymer concentration of 17.5 and 20.1%. Viscosities of these were measured between 5 and 70°C at various steps.

FLUIDICAM RHEO works with a visual acquisition system allowing to observe the product directly during the measurement. Below is an image of 20.1% solution taken during the acquisition.