MCR 302 Rheometer

Anton Paar GmbH

MEASURED PARAMETER	Shear rate, shear stress, viscosity
DETECTION METHOD	Rotation viscometry, oscillation rheometry
RANGE	*Temperature:* - 40 °C to 200 °C
	Torque: 0.01 µNm to 200 mNm
	Angular frequency: 10^{-7} rad/s to 628 rad/s
	Normal force range: 0.005 N up to 50 N
APPLICATIONS	Stability of creams and pastes
	Time-dependent and temperature-dependent fluid flow
	Characterisation of polymers
MATERIALS	Liquids of high or low viscosity such as oils, varnish and water
	Dispersions such as paints and pastes
	Solids, e.g. wood, polymers and metals

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From liquids to solid matter, everything flows in its particular way and can be observed in everyday life. Starting from the paint, which you use to paint your walls, the tooth paste, that you squeeze out of the tube, to the tennis ball, that you throw into the air during a tennis match on a Sunday. The flow and deformation behaviour are fundamental parameters for material characterisation.

The MCR 302 rheometer by Anton Paar measures the rheological properties, i.e. deformation and flow behaviour, of a sample. It enables the generation of flow and viscosity curves as well as the investigation of elasticity and deformation behaviour. Due to the temperature control unit, the experiment can be performed at any desired temperature.

During a rotation experiment, the sample experiences shear force at the contact area to the measuring head, while the head turns. The machine measures the torque or the rotational speed and calculates the shear rate $\dot{\gamma}$ and shear stress τ.

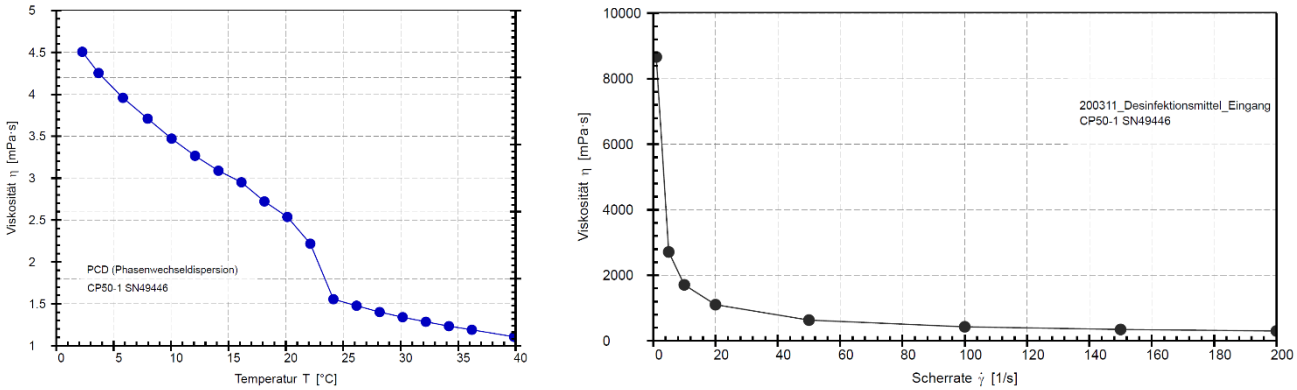

Fig. 1

Left: Measurement of a water-miscible temperature emulsion for machine tools (phase change dispersion) with constant shear rate and dynamic temperature program.

Right: Measurement of a disinfectant with constant temperature and dynamic shear rate.
Non-Newtonian fluid = pseudoplastic flow (shear-thinning)

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