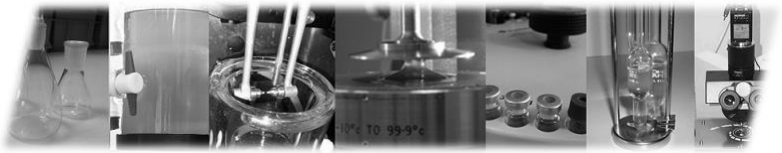
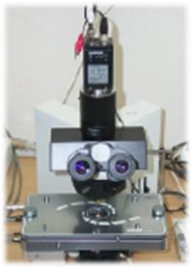
WEE-Solve GmbH



CONTRACT RESEARCH

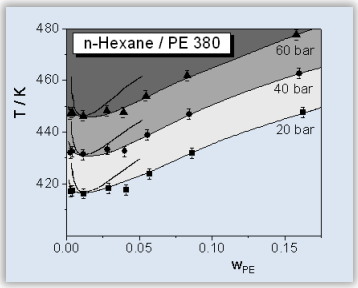


With our contract research we can answer individual questions of our customers. They profit from our long-term praxis-oriented research at the University of Mainz. We offer the following measurements as service:

Phase diagram

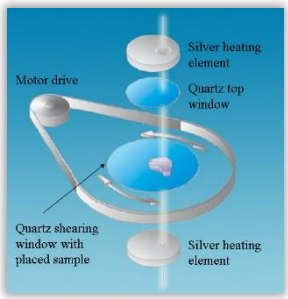
Most synthetic polymeric products are produced and processed in liquid systems. The knowledge about the physico-chemical behavior of the system dependent on pressure, temperature, and shear stress is essential for the optimization/improvement of the working conditions. This information can be shown in a phase diagram.

Under pressure



In industrial practice the solubility of substances in liquid solvents at temperatures above the boiling point, in fluidified or in supercritical gases is of great importance. For the determination of the solubility or of the general phase behavior a pressure cell with sapphire windows is available, where the miscibility can be established.

Under shear



For many applications the phase behavior under shear has a great importance, e.g. homogenous solutions should not phase separate during a mechanical handling, whereupon high shear rates exist. One can find the phenomenon of the shear induced homogenization of a two-phase system. That means clear solutions can get turbid by shaking and vice versa.

We are able to determine the phase behavior with two methods. On the one hand we can use an **optical shear cell** in combination with a microscope. These are the specifications of our measuring system:

- Optical shear cell: CSS 450 (Fa. Linkam Scientific, GB)
- Microscope BX 50 (Fa. Olympus)
- CCD-Camera Jai M 10 (Fa. Jai, Dänemark)
- Plate/plate-geometry (Gap: 5 -2,500 mm)
- Temperature range: 20 - 450°C
- Shear rate: 0,003-7.500 1/s

On the other hand, the change of the phase behavior of liquid systems can be determined **rheological**. The measurement of the viscosity as a function of the shear rate (flow resp. viscosity curve) can detect phase transitions in the phase diagram as a step wise change of the viscosity.

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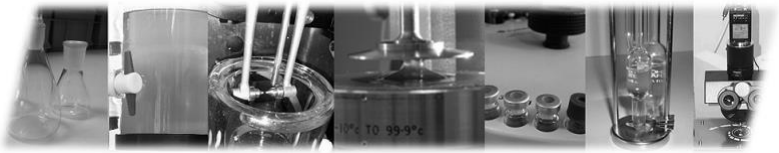
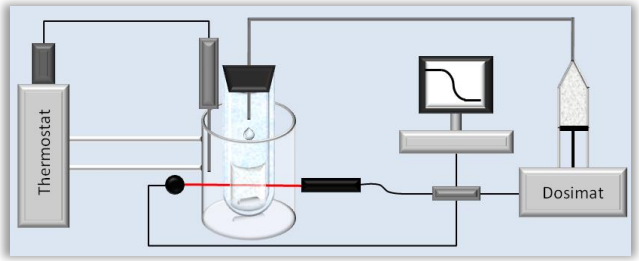
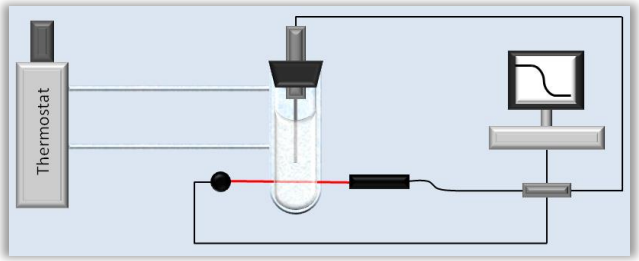


Phase behavior

For the analysis of the cloud point curve and the phase diagram of e.g. polymer solutions as function of temperature and composition, we use two constructions. The temperature range is in both cases from 15 up to 190°C. Further temperatures are available on request.



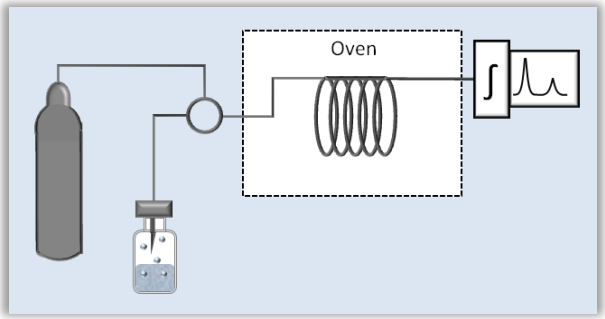
As a function of composition

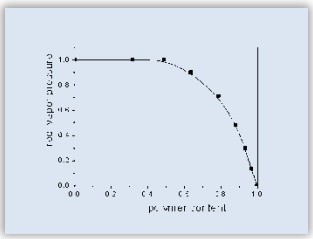


As a function of temperature

Vapor pressure

With this method the vapor pressure of polymer solutions or of colloid suspensions can be measured. The measuring instrument is made up of a headspace sampler and a gas chromatograph. This method is used for the quantification of interactions between polymers and solvents.





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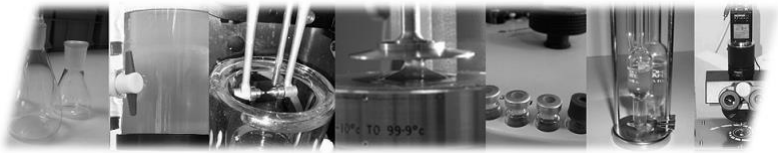

Morphology under shear

Our equipment enables us the observation of complex liquids relating to its structural dynamics under temperature-controlled shear. Examples are coarsening binary liquid during its phase separation, shear induced mixing or demixing of polymer blends, defect dynamics of liquid crystals, aggregation of red blood cells and their deformation during the shear/flow etc.

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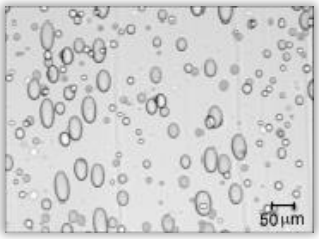

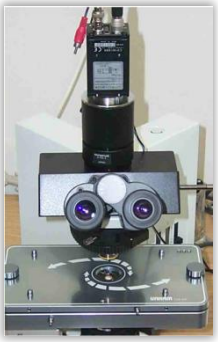

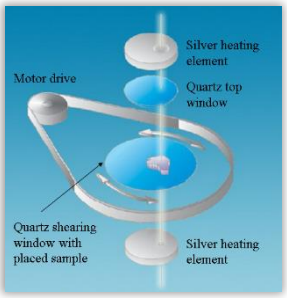

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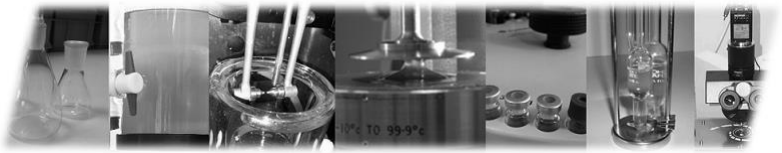

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