



## Contract research

WEE-Solve  
GmbH



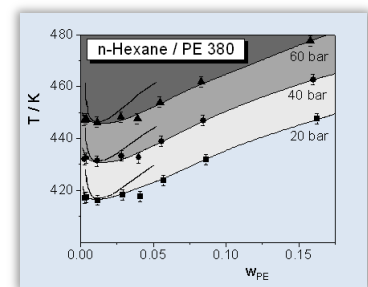
With our contract research we can answer individual questions of our customers. They profit from our long term praxis oriented research at the University of Mainz. We offer the following measurements as service:

### Phase diagrams

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 optimiation / 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 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.

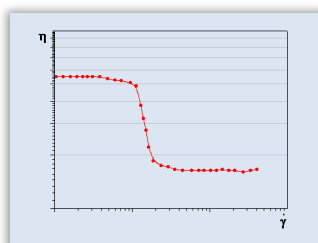
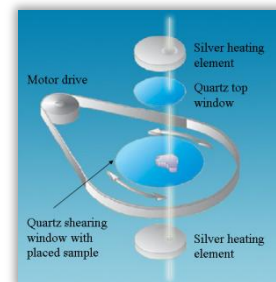


#### Under shear

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.

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 (Linkam Scientific, GB)
- Microscope BX 50 (Olympus)
- CCD-camera Jai M 10 (Jai, Denmark)
- Plate/plate-geometry (gap width: 5 - 2.500  $\mu\text{m}$ )
- Temperature: 20 - 450°C
- Shear rate: 0,003-7.500 1/s

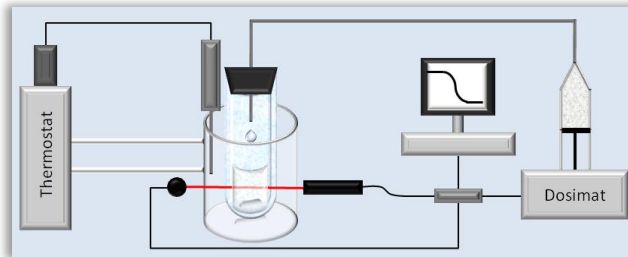


On the other hand the change of the phase behavior of liquid systems can be determined rheological. The measurement of the viscosity as a function of the shear rate (flow curves) can detect phase transitions in the phase diagrams as a step wise change of the viscosity.

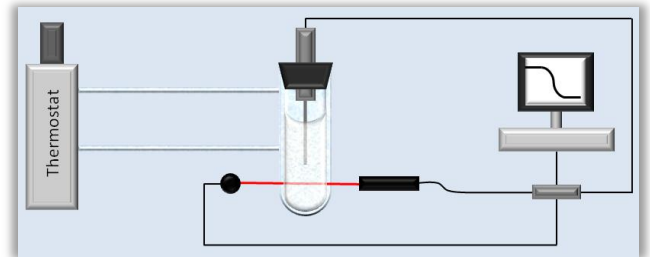


### Cloud point measurements

For 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°C up to 190°C. Further temperatures are available on request.



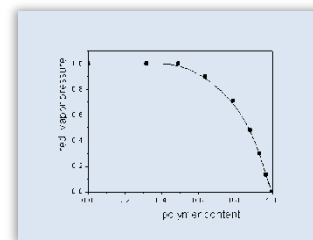
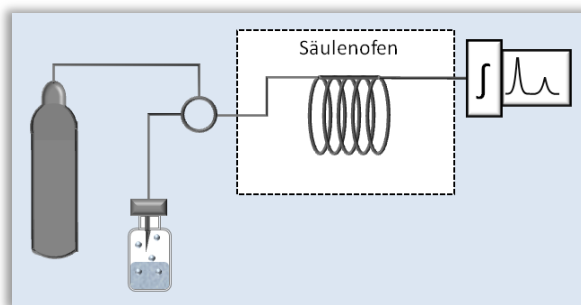
As function of composition

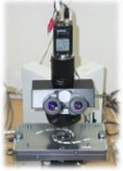


As function of temperature

### Vapor pressure measurements

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. The method is used for the quantification of interactions between the polymer and the solvent.





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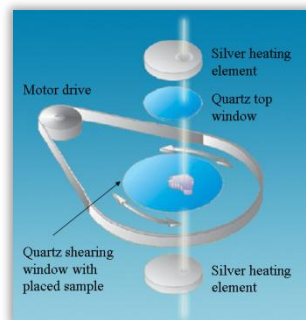
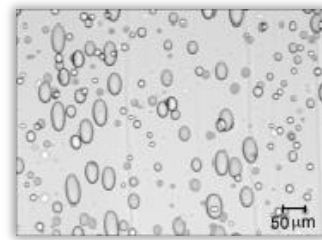


### Morphology under shear

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.

The measuring system consists of a microscope and an optical shear cell. These are the specifications:

- 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 width: 5 - 2,500  $\mu\text{m}$ )
- Temperature: 20 - 450°C
- Shear rate: 0.003-7,500 1/s





## Contact

### Headquarters

WEE-Solve GmbH  
Auf der Burg 6  
55130 Mainz  
Germany

Telefon +49 (0) 6131 49 48 644  
Telefax +49 (0) 6131 49 48 648  
E-Mail: [info@wee-solve.de](mailto:info@wee-solve.de)

### Laboratories

WEE-Solve GmbH  
Wöhlerstr. 2-6  
Gebäude B  
55120 Mainz  
Germany

## Impressum

WEE-Solve GmbH

Represented by Dr. John Eckelt - CEO

Auf der Burg 6  
55130 Mainz  
Germany

phone +49 (0) 6131 49 48 644  
fax +49 (0) 6131 49 48 648  
email: [info@wee-solve.de](mailto:info@wee-solve.de)

Commercial Register no.: Amtsgericht Mainz HRB 40955  
Tax no.: 26/671/0314/4  
VAT ID no.: DE255212689