

PCL Thermal and Rheology, IV Lab


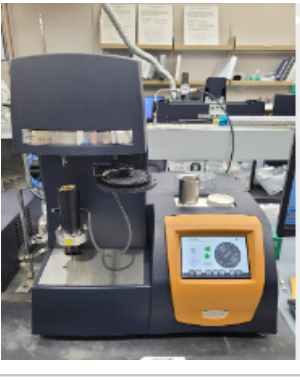
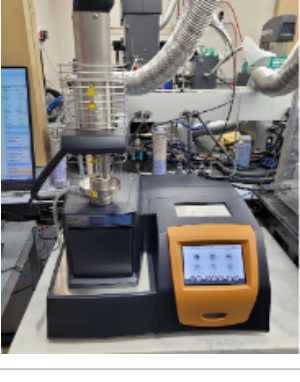
Principle



Thermal and Rheology, IV

Capabilities

- TGA, DSC, TMA, DMA
- Thermal Conductivity
- Capillary Rheology
- Melt Flow Index
- Inherent Viscosity
- Solution Rheology


Equipment: Thermal

	Equipment Type	Information
	Differential Scanning Calorimetry	<ul style="list-style-type: none">• Differential Scanning Calorimetry measures heat flow as a function of time or temperature<ul style="list-style-type: none">◦ ASTM D3418; -90°C to 550°C in N2◦ Tm, Tc, Tg, percent crystallinity, heats of fusion and crystallization, rate and degree of cure, specific heat capacity
	Thermogravimetric Analysis	<ul style="list-style-type: none">• Thermogravimetric Analysis measures mass change as a function of time or temperature<ul style="list-style-type: none">◦ ASTM E1131 up to 1000°C in N2 or air◦ Compositional analysis, thermal stability, decomposition kinetics, filler content
	Thermomechanical Analysis	<ul style="list-style-type: none">• Thermomechanical Analysis measures dimension change as a function of time, temperature, or force<ul style="list-style-type: none">◦ ASTM E831 and ISO 11359; -70°C to 1000°C◦ Coefficient of linear thermal expansion

	<p>Dynamic Mechanical Analysis</p>	<ul style="list-style-type: none"> • Dynamic Mechanical Analysis mechanically deforms samples and measures response with respect to frequency, stress, strain, time, or temperature <ul style="list-style-type: none"> ◦ TA Instruments ARES-G2 Rotational Rheometer - Parallel plate, torsion, 3 point bend, and films ◦ Forced convection oven up to -150°C to 600°C ◦ Viscoelastic properties, storage modulus, loss modulus, Tg, cross-linking, lifetime predictions
	<p>Thermal Conductivity</p>	<ul style="list-style-type: none"> • Thermal Conductivity measures materials ability to conduct heat <ul style="list-style-type: none"> ◦ ASTM E1461 Thermal Diffusivity by Laser Flash

Equipment: Rheology

Wide range of techniques for measuring flow behavior of materials

	Equipment Type	Information
	<p>Melt Flow Indexer</p>	<ul style="list-style-type: none"> • Melt Flow Indexer measures relative ease of flow and rate of extrusion <ul style="list-style-type: none"> ◦ ASTM D1238 and ISO 1133 Procedures A and B ◦ Melt flow rate, melt volume rate, melt density ◦ Capability to measure up to 425°C



Capillary Rheometer

- **Capillary Rheology** measures shear viscosity and flow behavior
 - ASTM D3835 and ISO 11443
 - Apparent shear viscosity and melt stability as a function of time, temperature, or shear rate
 - Capability to measure up to 450°C



Solution Rheometer

- **Solution Rheology** measures polymer solution viscosity as a function of time or shear rate with a concentric cylinder




Dilute Solution Viscosity

- **Dilute Solution Viscosity** measures inherent viscosity of polymer solutions
 - ASTM D5225 - Differential pressure viscometer
 - ASTM D2857 - Glass capillary viscometer


Mission	Thermal and Rheology, IV is our mission.
Techniques	Thermal and Rheology, IV <ul style="list-style-type: none"> •

Team



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