HAAKE Viscometer 7 R+

Location of Machine: Composites Lab, RFM 1218

Location of SOP and Machine Operating & Safety Manual: Composites Lab website under resources; Composites Lab TRACS site; and Hardcopy near machine.

Emergency Contact:

- Call 911
- Call EHS & Risk Management at 512-245-3616
- Call Head Lab Technician, Dr. Ray Cook (office 512-245-2050)
- Call Dr. Jitendra S Tate (office 512-245-4872)

Before using this machine:

- You must have permission from Dr. Tate.
- You must have received formal training from technician or, trained research student (designated by Dr. Tate) related to machine safety and operation.
- You must read and understand **SOP and Machine Cleaning Manual.**
- You must use this machine under direct supervision of Dr. Tate or, Dr. Cook or, trained research student (designated by Dr. Tate).
- You must have signed "Lab Rules" document with Dr. Tate. This document must be signed every semester fall, spring, and summer (as applicable).
- If you do NOT follow above instructions you will be held responsible for your own safety and damages.

Safety Precautions:

Protective Equipment: Prior to performing this procedure, the following personal protective equipment must be obtained and ready for use: **Gloves, Safety Goggles, Face Mask, Lab Coat.**

Important Safeguards:

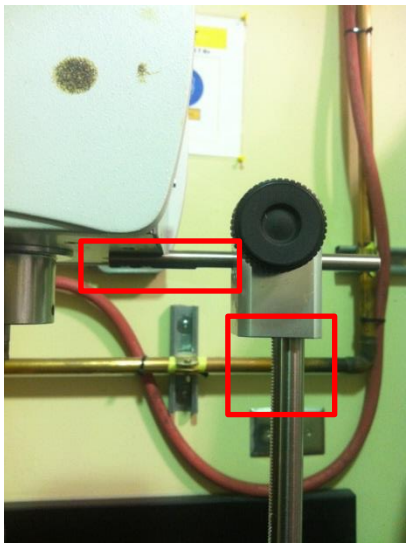
1. Prior to performing this procedure, the following safety equipment must be accessible and ready for use: (e.g. chemical fume hood, biological safety cabinet, laminar flow hood, chemical spill kits) **Fume hood**
2. All liquids should be drained to containers for chemical disposal and properly marked.
3. In the event that a hazardous material spill during this procedure, be prepared to clean with cleaner according to MSDS of materials used.

General Information

Viscosity is a measure of the resistatnce of a fluid which is being deformed by either shear stress of tensile stress. Viscosity and viscoelastic behavior of resins are very critical in composites manufacturing. Our lab is equipped with a classic rotational viscometer for the fast determination of viscosity as defined in ISO 2555 and more ASTM standards. For the determination of the rheological properties of a substance the measuring range can be changed by suing a different speed or by a change of the spindle. The selection depends on the standard to be followed.

Specifications:

Operating Temperature Range: -20 to 100ºC
Reproducibility: ±1%
Hertz: 50-60Hz
Speed Range: 0.5-800rpm
Torque Range: 0.1-30mNm
Typical Testing Time: 1 min
Viscosity Range 1-1,000,000 mPas

Viscometer Operating procedure	
1. Viscometer Assembly a. Attach vertical pole to the base using the wrench provided in the case b. Attach the viscometer to the vertical pole c. Connect power cable to the viscometer d. Optional (if needed): Attach the thermometer to the back panel e. Optional (only for large beakers): Attach the frame to the viscometer	
2. Turn on the viscometer a. Plug in the power cable to 110 V power outlet b. Turn of switch on the back panel of the viscometer 3. Calibration a. After the viscometer is turned on the following message will appear: "Calibration is out of date, remove spindle and press enter" b. Make sure the spindle is not attached c. Press enter	
4. Starting up • Selected required spindle type from the case (Usually: R2-largers) • Attach the spindle. Note: Spindle has left-handed thread • The machine is ready to use	
5. Placing the beaker	

a. Raise the viscometer to the highest level using a screw on the vertical pole
b. Place beaker with liquid under the spindle
c. Lower the viscometer until the spindle is submerged to the spindle's mark
d. Optional (if used): Submerge the thermometer to the liquid

6. Measuring
   a. Using "Enter", "Up", and "Down": select spindle type and speed
   b. Press "Start"
   c. Use "Enter" to change the speed
   d. Use "Stop" to stop the process

7. Notes
   a. Wait for 30-60 sec before reading
   b. Good results are in range 60%-80% of torque
   c. Viscometer with beep (and indicate "Error") if under/over loaded
   d. Results depend on beaker and volume of liquid
   e. Use the same beakers for comparison measurements

8. Disassembly/Cleaning a. Turn off the viscometer b. Disassemble the viscometer c. Clean the spindle and frame (if used) with cleaner according to MSDS of liquid used d. Return the components to the case e. Return the case to the drawer