Racing Surfaces Testing Laboratory

907 National Avenue
Lexington, KY 40502
207.570.9869

Standard Testing Procedure

SYNTHETIC WAX SEPARATION

This procedure has been superseded by repeat-cycle soxhlet solvent extraction.

Note:
This test is for synthetic material only. All work should be done with proper ventilation (in a chemical hood) and proper personal protective equipment must be used. At a minimum safety glasses and solvent resistant gloves should be used at all times. If performing any or all of the processing outdoors ensure proper containment of waste solvent. For each location to be tested, two 300-g samples are required.

1) Weigh approximately 800 g of synthetic track material for each track location to be tested. Split the 800 g into 2 rectangular, flat trays (or bread pans). Some tracks may have a considerable amount of rubber pieces. Put the track information and date it was removed from track on 3x5 cards and place cards in trays with today's date.

2) Dry the material. Refer to the moisture removal synthetic procedure for details.

3) Remove any large rubber pieces (more than 1 cm in any direction) from the material. Some tracks may have a considerable amount of rubber pieces.

4) Label two of the 500 mL beakers as track material sample A and track material sample B ("MAT A and MAT B"). Label the other two more 500 mL beakers as solvent beaker A and solvent beaker B ("SOLV A and SOLV B"). Also include the project number and sample identifier. Use permanent marker to mark. Be careful not to confuse samples.

5) Weigh the four 500 mL beakers (2 MAT and 2 SOLV) individually using a scale accurate to ±0.01g and record the weights on the datasheet under "Initial Weight of Material Beaker" and "Initial Weight of Solvent Beaker." Tare scale and add approximately 300 g of track material into each MAT beaker. Record the weight of the sample in each MAT beaker on the data sheet under "Initial Weight of Material + Wax."

6) Cover the SOLV beakers with foil and set aside.

7) Turn on the fan of the chemical hood. Measure 250 mL of fresh solvent (Iso-Octane) with an empty beaker and add most of it to the MAT A sample. Leave approximately 1cm remaining in the beaker. Stir the solvent and material with a glass stirring rod to insure full contact between solvent and sand. Rinse stirring rod with the remaining solvent in the beaker into the material beaker to prevent wax from being removed from the material beaker.

8) Repeat step 7 with the MAT B sample.

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9) Place glass covers over the beakers.

10) Place 500 mL beakers with track material into ultra-sonic bath. Make sure that the water level is above the level of the solvent in the beakers. Add tap water if the water level is too low.

11) Turn on the ultra-sonic bath. The bath will become warm, about 45 degC (113 degF).

12) After 1 hour, increase the temperature on the vacuum furnace to 100 degC (212 degF) in preparation for evaporation (step 14). This step may be omitted if the oven is already on and at the correct temperature.

13) After approximately 1.5 hours, turn off the ultrasonic bath(s) momentarily to manually stir contents of each beaker to ensure the sand is exposed to solvent. Do not remove the beakers from the bath(s). Carefully rinse the stirrer with clean solvent back into beaker after each beaker is stirred. A squirt bottle of solvent or a small amount of solvent in an empty beaker can be used to rinse the stirrer.

14) After 2 hours, remove each material beaker from the bath and dry water from exterior of the beaker to avoid getting water in the sample.

15) Allow the material beaker to stand for at least one minute to ensure particulates have settled. Do not allow the samples to sit for more than 10 minutes, as they will begin to cool. Decant solvent from track material into the solvent beaker (MAT A into SOLV A, MAT B into SOLV B). Do not allow any solid material to escape to the decanting beaker.

16) Place the solvent beaker into the vacuum furnace set to 100°C (212°F).

17) Completely open both the EVACUATION and PURGE ports on front of vacuum furnace (if not already open), and turn on the vacuum pump. The reading on the vacuum gage should be between 0 and 2.5 inches of Hg.

18) Repeat steps (7) thru (16) two more times for a total of 3 decantings.

19) Use the vacuum furnace (set at 100°C) to evaporate the solvent in both the material and solvent beakers. Do not turn off the fan of the chemical hood until all of the solvent has evaporated.

20) After 1 or 2 days, remove the MAT and SOLV beakers and weigh them. Record the weights under “Post-volatilization Weight Material Beaker” and “Post-volatilization Weight Solvent Beaker.” If the final total mass of the beakers is within 0.2% of the beginning mass, then the material and wax samples can be said to be free of solvent (fully dry). It is easiest to determine this by entering the data into the computer spreadsheet and checking the cells labeled “Percent error.”

21) When the solvent is fully evaporated, closely inspect the texture of the sand in the material beaker. It must be stirred and loosened to ensure all wax has been removed. The sand must feel dry and not waxy or oily to the touch. It should flow freely like sugar off a spoon. If the sand is still waxy/oily to the touch or still clumps together, a fourth round of solvent bathing in the ultra-sonic bath is required. Begin again at step (7). Note that some sand may be very dark in color naturally, so if it does not feel waxy/oily and flows freely it is free of wax.

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22) Carefully remove all the separated wax from the bottom of solvent beakers and put into labeled plastic bags. It is helpful to heat wax in an oven to facilitate wax removal. Do not discard any wax. Label and put the de-waxed material into bags. Samples from the same location (ie: ¼ pole SOLV A and B wax) can be placed into the same bag if wax percents are similar.

23) Clean all glassware carefully with dishwashing soap and hot water. A small amount of solvent may assist with stubborn residual wax.

Revision No.	Date	Revision By	Description
1.0	01-Oct-2008	B. Horton	Created and issued procedure
1.1	13-Feb-2009	J. Bridge	Modified step (11) from “one” to “one-two” minutes, added volatization temperature 100 degC to step (13).
1.2	05-Apr-2009	J.Bridge	Clarified several steps to accommodate current facility and equipment, also removed the stirring right before decanting and added stirring while still in ultrasonic bath.
1.3	03-Aug-2009	M. Segee	Changed step one to be 700 g of track material, removed note in step nine about checking ultrasonic bath after one hour, clarified step fourteen.
1.4	23-Apr-2012	M. Segee	Clarified steps
1.5	23-Nov-2012	A. Eguren	Clarified step 3.
1.6	19-Jul-2013	M. Segee	Clarified and rearranged steps.
1.7	26- Feb-2019	H. Adams	Update address and phone number