Tex-211-F, Recovery of Asphalt from Bituminous Mixtures by the Abson Process

Overview

Effective date: August 1999 to October 2004.

This method, a modification of ASTM D 1856, covers the procedure for the recovery of asphalt in sufficient quantity for further testing after the extraction of a bituminous mixture.

Apparatus

The following apparatus is required:

- apparatus listed in Test Method "Tex-210-F, Determining Asphalt Content of Bituminous Mixtures by Extraction," for extraction of asphalt from paving mixtures
- centrifuge, capable of handling two 237 mL (8 oz.) wide-mouth bottles at 770 times gravity. A centrifuge operated at approximately 2200 rpm will meet these requirements.
- ventilation – an adequate ventilation system to remove solvent fumes
- wide-mouth 237 mL (8 oz.) bottles
- distillation assembly as shown in the 'Primary Distillation Apparatus' and the 'Secondary Distillation Apparatus,' consisting of the following items:
  - heating mantle with controller, supported on ring stand
  - condenser, glass-tube type having a condenser water-jacket approximately 400 mm (15.75 in.) in length fitted with distillation column and bent glass tube on discharge end for directing the flow of liquid solvent into flask
  - upright metal supports (ring stands, flexa-frame, clamps, etc.) for the entire distillation assembly
  - three-neck distillation flask, 500 mL (17 oz.) capacity
  - collecting flask
  - corks, assorted sizes
  - mercury thermometer, capable of measuring the temperature specified in the test procedure and marked in 1 °C (2 °F) divisions
  - aeration tube for primary distillation, a 406 mm (16 in.) piece of 6.35 mm (0.25 in.) copper tubing with one end soldered closed. Bend the tube at a 90° angle 76 mm (3 in.) from the soldered end, being careful not to crimp the tubing. Drill eight 1.6 mm (0.0625 in.) holes on the bottom surface of the 76 mm (3 in.) bend, beginning approximately 6.35 mm (0.25 in.) from

the soldered end, about 6.35 mm (0.25 in.) apart. Bend the 76 mm (3 in.) extension to form a circle perpendicular to the 330 mm (13 in.) length, being careful not to crimp the tubing.

- aeration tube for final distillation, a 6.35 mm (0.25 in.) copper tube bent on one end to fit the curvature of the distillation flask – having 6 holes 1.6 mm (0.0625 in.) drilled on 6.35 mm (0.25 in.) centers along the convex side of bend. The curved end should be sealed with the first hole 6.35 mm (0.25 in.) from the end.
- gas flow meter, or equivalent, capable of indicating a gas flow up to 1000 mL (34 oz.) per minute
- rubber or plastic tubing, to supply cool water through the condenser and to connect gas flow meter, aeration tube and supply of carbon dioxide.

♦ tin cans, 89 mL (3 oz.) seamless

♦ glass boiling flask, 3000 mL (101 oz.) capacity

♦ balance readable to 0.1 g and accurate to 0.5 g.

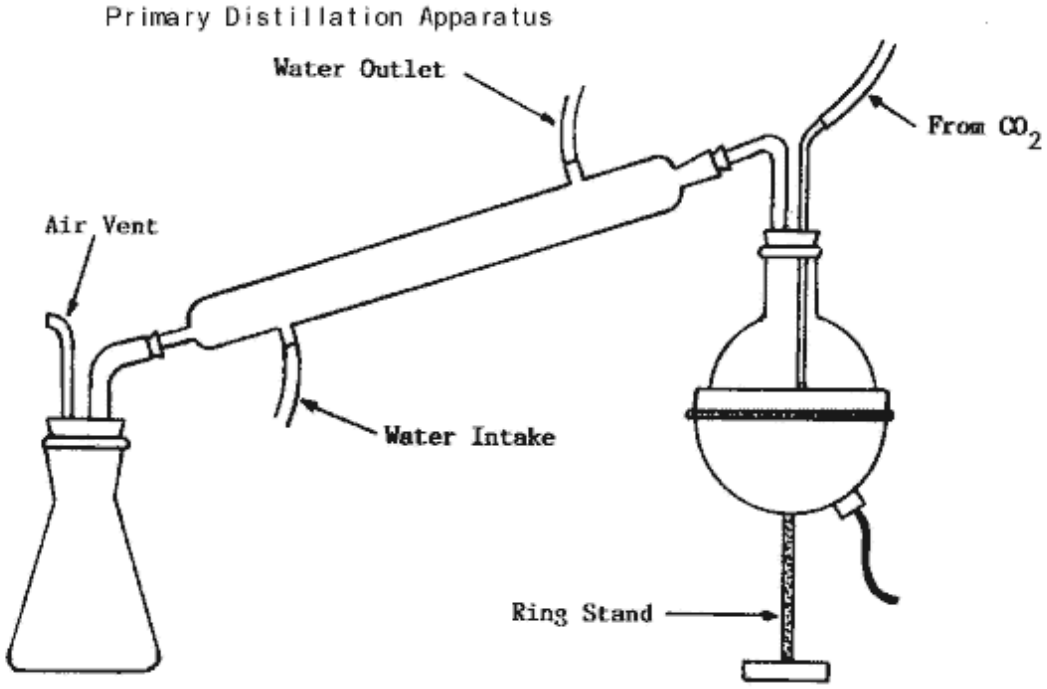

Figure -1.Primary Distillation Apparatus.

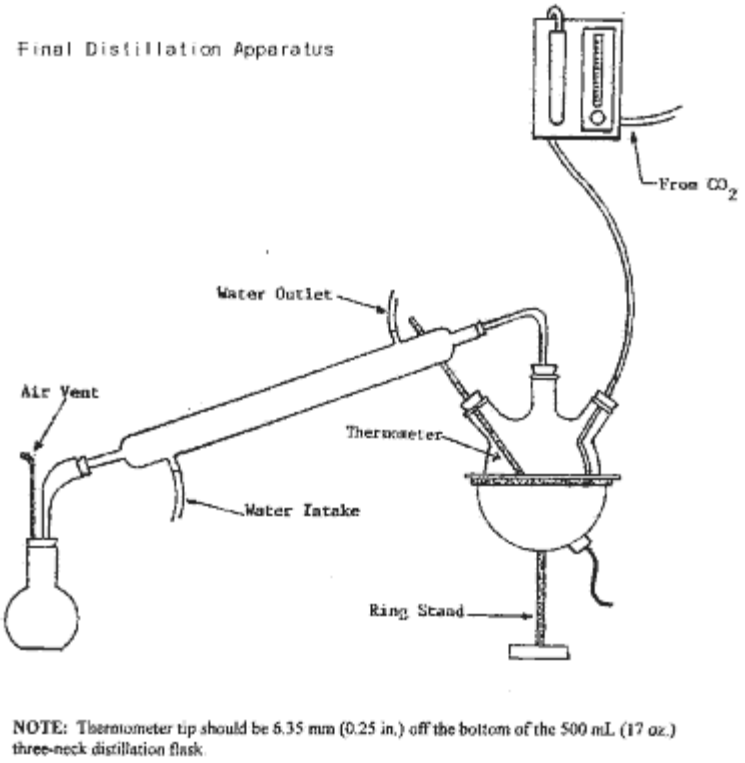

Figure -2. Secondary Distillation Apparatus.

Materials

The following materials are needed:

- trichlorethylene or other approved solvents
- supply of carbon dioxide gas (equipped with pressure gauge and regulator).

Test Sample

A sample of bituminous mixture of sufficient size to produce at least 100 g of recovered asphalt is required. Approximately 1500 to 2000 g of the mixture will usually be sufficient.

Procedure

Follow these steps to effect recovery of asphalt from bituminous mixtures by the Abson Process.

Recovery of Asphalt from Bituminous Mixtures by the Abson Process	
Step	**Action**
1	Extract the asphalt from the asphaltic paving mixture according to the procedure given in Test Method "Tex-210-F, Determining Asphalt Content of Bituminous Mixtures by Extraction."

Recovery of Asphalt from Bituminous Mixtures by the Abson Process	
Step	**Action**
2	♦ Pour the extracted solvent and dissolved asphalt solution into the 3000 mL (101 oz.) glass bubble flask and connect condenser (see 'Primary Distillation Apparatus'). ♦ Distill the solution until approximately 400 mL (13.5 oz.) remain in the flask. ♦ Use a clean container to collect the reclaimed solvent. ♦ During this distillation process, gently bubble carbon dioxide (CO_2) through the solution to prevent pressure build-up and 'blow-over.'
3	♦ Pour an equal amount (about 200 mL [6.8 oz.]) of the concentrated asphalt solution into two 237 mL (8 oz.) wide-mouth bottles. ♦ Carefully adjust the contents of the containers so the two bottles with contents and stoppers have the same weight.
4	Place the bottles into the centrifuge, and centrifuge the solution at room temperature for 30 minutes at 770 times gravity.
5	Pour the centrifuged solution from the two bottles into the 500 mL (17 oz.) three-neck distillation flask, taking care not to disturb the sediment at the bottom.
6	♦ Using the distillation assembly shown in the 'Secondary Distillation Apparatus,' adjust the applied heat so the solvent will be removed at a uniform rate by distillation. ♦ To prevent pressure build-up and 'blow-over,' gently bubble carbon dioxide gas through this solution at a very low rate by means of the aeration tube connected to the flow meter. ♦ The rate of flow of the carbon dioxide and the heat should be adjusted so the solution does not boil too vigorously.
7	♦ When the temperature reaches 157 to 160 °C (315 to 320 °F), increase the carbon dioxide gas flow to approximately 900 mL/min. (30 oz./min.). ♦ Maintain this flow for 10 minutes while maintaining the temperature of the residue in the flask at 160 to 168 °C (320 to 335 °F).
8	♦ If after 10 minutes the distillation is not complete, continue the process until 5 minutes after the dripping ceases to flush solvent vapors from the flask. ♦ The entire test must be completed in no more than 8 hours.
9	Remove the heat, shut off the carbon dioxide gas, and disassemble the flask with contents.
10	Pour the asphalt in the flask into the 89 mL (3 oz.) seamless can for further testing.