

## ATT 31/95 VISCOSITY, Zahn, Seal Coat Emulsions

### 1.0 SCOPE

This method describes the procedure for determining the Zahn viscosity in seconds of anionic and cationic asphalt emulsions.

### 2.0 EQUIPMENT

Zahn #3 viscosimeter

stop-watch

bi-metal thermometer

acetic acid solution or vinegar solution (1% vinegar cut 1:5 with water), if testing cationic emulsions (RS-1K, RS-2K, QS-Kh)

clean water, if testing anionic emulsions (RS-1, RS-2, SS-1, SS-1(H))

#### 2.1 Zahn #3 Viscosimeter

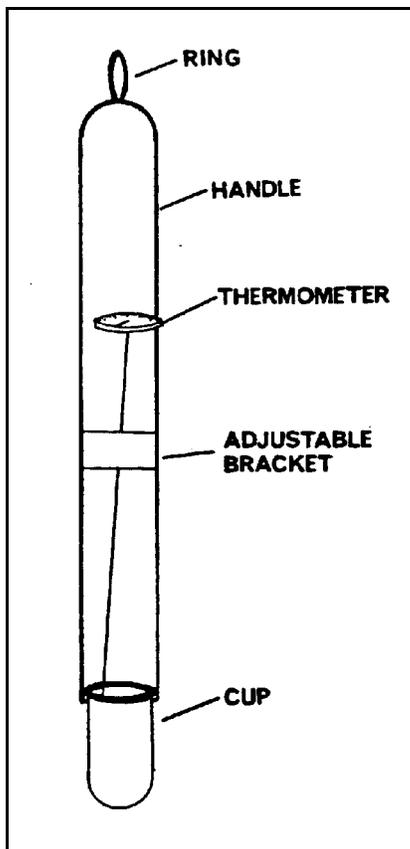


Figure 1

The Zahn #3 viscosimeter, as shown in Figure 1, consists of a bullet-shaped cup with an orifice at the bottom and a loop-type handle at the top. A small ring is fitted to the handle for a finger support, which is used to keep the cup in a vertical position when the device is withdrawn from the liquid being tested. Also affixed to the handle is an adjustable bracket designed to hold bi-metal thermometer.

### 3.0 PROCEDURE

1. Rinse the clean Zahn viscosimeter with:
  - a) the acetic acid or vinegar solution, if the emulsion is cationic, or
  - b) the clean water, if the emulsion is anionic.
2. Dry the cup.
3. Insert the thermometer into the holes provided in the bracket so that the stem rests in the cup.

4. Stir the emulsion thoroughly, and with thumb in the ring, dip the cup into the emulsion.  
**NOTE:** Stirring is not required when the sample obtained for testing comes from the tank of a truck that has been standing for less than two hours.
5. Wait one minute, then record the temperature of the emulsion.
6. Adjust the bracket so that the thermometer stem is out of the cup.
7. Lift the viscosimeter completely out of the liquid and start the stop-watch when the top edge of the cup breaks the surface.
8. Stop the watch when the steady flow of emulsion out of the orifice first stops.
9. Record the time in seconds.
10. Repeat steps 4 to 9 to check the obtained time for a minimum of 3 readings.  
**NOTE:** Do not clean the viscosimeter between runs. Dip the viscosimeter back into the emulsion as fast as possible after each run to prevent the breaking of the emulsion film and the cooling of the cup.
11. Express the average viscosity in Zahn # 3 seconds and record the temperature.
12. Rinse the viscosimeter with water first and then clean it with solvent and dry soft, lint-free cloth. Make sure that the orifice is free from obstructions.

#### **4.0 HINTS AND PRECAUTIONS**

1. The orifice and cup must be protected from damage when the instrument is not in use.
2. There is no general formula for converting Zahn # 3 viscosity in seconds to other viscosity terminology. This is because emulsions have different flow characteristics with respect to the cup's surface even if they have the same absolute viscosity.