DIRECTIONS FOR TEST NO. 14-10-32

SUBJECT: Specific Gravity of Liquid Aroclors

METHOD: Westphal Balance

General

Specific gravity is determined by means of the Westphal balance. The temperatures at which the specific gravities of liquid Aroclors are taken vary with the viscosity of the liquid. The specifications for each Aroclor should state the temperature for both the Aroclor and the Water to which comparison of gravity is made. In plant practice, specific gravities of Aroclors containing up to 54% chlorine are made at 65/65°C while specific gravities of Aroclors containing 60-62% chlorine are made at 90/90°C.

Specific gravities of any of the Aroclors may be made at 25/25°C by use of the A.S.T.M. method for road tars, asphalt cements, soft tars pitches, serial designation D70-27, 1927 (described in Bureau of Standards Miscellaneous Publication No. 110, Standards and Specifications for Nonmetallic Minerals and their products, page 125.)

Apparatus

Westphal Balance: Similar to Eimer and Amend Catalogue No. 16930. Plummet need not have thermometer scale to 90°C but should not be subject to injury by use at this temperature.

Cylinder: Pyrex glass hydrometer jar 1.5" x 6".

Thermometer: Use thermometer which has been checked for accuracy of scale in the range used.

Procedure

Place the Westphal in such position that the plummet is 7 - 9 inches above the work bench. By means of the leveling screw, adjust the Westphal balance to show zero reading with a clean dry plummet in air. Suspend the plummet during adjustment in a empty cylinder to protect the apparatus from air currents.

Heat the Aroclor to be tested to a temperature about 15° higher than the temperature at which determination is to be made. For example, if specific gravity is wanted at 65°C, the Aroclor should be heated to about 80°C. Then pour the heated Aroclor into a clean Pyrex cylinder which has been warmed by setting at edge of hot plate.

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The cylinder should be filled with the Aroclor to within about 1 inch of the top.

Allow the Aroclor in the cylinder to air cool until the temperature is about 7 degrees above that desired, then place the cylinder in a hot water bath which is at a temperature about 5 degrees above the desired temperature. A liter beaker containing sufficient water to be equal to or above the level of the Aroclor in the cylinder is a satisfactory water bath. In case the Specific Gravity is to be taken at 90/90°, a glycerin bath should be substituted for the water bath to avoid the water vapor with its condensation on the Westphal balance which is present if water is used at high temperatures such as 95°C.

Without disturbing the adjustment of the Westphal which is set to read zero with plummet in air, place the cylinder containing the Aroclor in such position that the plummet is immersed in Aroclor and add weights to the beam of the Westphal until the beam is again level. The plummet should now be completely immersed as well as about 1/2" of the suspension wire and the plummet should not touch the cylinder at any point. Stir the Aroclor with a thermometer at frequent intervals until the desired temperature just is reached. At this point the weights are quickly adjusted until equilibrium is obtained and the reading noted.

Having obtained the reading for Aroclor at the desired temperature, the specific gravity is obtained by dividing this figure by the reading when the plummet is immersed in pure water at the same temperature. The reading for water is obtained in the same manner as for Aroclor. Since the reading for water is constant, provided there are no errors in weights or Westphal, this figure need not be determined with each Aroclor test. The figure for water which is used as a constant should, however, be checked once amonth or whenever greatest accuracy is needed. The readings for water at 65°C and 90°C are respectively .9828 and .9672.

Calculation of Result

Example 1. Assume readings as follows:

Westphal reading with plummet in air	Zero
Westphal reading with plummet in Aroclor at 65°C	1.5025
Westphal reading with plummet in water at 65°C	.9828

Then sp. gr. at 65/65°C = $\frac{1.5025}{.9828}$ = 1.5288

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METHOD: Westphal Balance

Example 2. Assume readings as follows:

Westphal reading with plummet in air	Zero
Westphal reading with plummet in Aroclor at 90°C	1.5435
Westphal reading with plummet in water at 90°C	.9672

Then sp. gr. at 90/90°C = $\frac{1.5435}{.9672}$ = 1.5958

Notes

1. The weights used with the Westphal balance should be checked periodically by weighing each on an analytical balance.

2. The adjustment of the liquid to the exact temperature desired is most important. Do not allow to cool rapidly and stir frequently enough to maintain a uniform temperature from top to bottom in the cylinder.

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