Monsanto Chemical Company

Anniston Method No. 14-24-48

SUBJECT: Flash and Flame Points

METHOD: Cleveland Open Cup

The flash and flame points of Aroclor shall be determined in the Cleveland Open Cup Tester, following the procedure described in ASTM D 92-33.

Apparatus

The cup shall be supported by a metal plate 1/4" (.635 cm) in thickness and 6 inches (15.24 cm) in width. The plate shall be of brass, cast iron, wrought iron, or steel. In the center of the plate there shall be a plane depression 1/32" (.079 cm) in depth, and of just sufficient diameter to fit cup. There shall be a circular opening 2 3/16" (5.50 cm) in diameter, cut thru the plate, centering with the center of the above mentioned depression. The plate shall be covered with a sheet of hard asbestos board 1/4" in thickness, and of the same shape as the metal plate. There shall be cut in the center of the asbestos board a circular hole just fitting the cup. Heat may be supplied from any convenient source. The use of a gas burner, electric heater, or alcohol lamp is permitted, but under no circumstances are products of combustion or free flame allowed to come up around the cup. The source of heat shall be centered under the opening in the plate and shall be of a type that will not produce local superheating. If a flame heater is used, it may be protected from drafts or excessive radiation by any suitable type of shield, that does not project above the level of the upper surface of the asbestos board. The thermometer shall conform to the requirements of thermometer No. 8. (See ASTM table of thermometers).

Procedure

The thermometer shall be suspended or held in a vertical position by any suitable device, the bottom of the bulb shall be 1/4 in. (.635 cm) from the bottom of the cup, and above a point half way between the center and back of the cup. The cup shall be filled with oil to be tested in such a manner that the top of the meniscus is exactly at the filling line at room temperature. The surface of the oil shall be free from bubbles. There shall be no oil above the filling line or outside of apparatus. The test flame shall be approximately 5/32" (.397 cm) in diameter.

The test flame shall be applied as the temperature read on the thermometer reaches each successive 5°F mark. The flame shall pass in a straight line, (or on the circumference of a circle having a radius of at least 6 inches.) across the center of the cup and at right angles to the diameter passing thru the thermometer. The test flame shall, while passing across the surface of the oil, be in the plane of the upper edge of the cup. The time for the passage of the test flame across the cup shall be approximately 1 second.

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The oil shall be heated at a rate not exceeding 30°F per minute temperature rise till a point is reached approximately 100°F below the probable flash point of the oil. Thereafter the rate of heating shall be decreased and for at least the last 50°F before the flash point is reached the rate shall be not less than 9°F. or more than 11°F per minute.

The flash point shall be taken as the temperature read on the thermometer when a flash appears at any point on the surface of the oil. The true flash must not be confused with a bluish halo which sometimes surrounds the test flame.

After determining the flash point, the heating shall be continued at the specified rate of 9°F to 11°F per minute, and application of the test flame shall be made at the specified intervals until the oil ignites and continues to burn for a period of at least five seconds. The method of application of the flame shall be the same as for flash point. The temperature read at the time of the flame application, which causes burning for a period of five seconds or more, shall be recorded as the flame point.

The flash point and flame point tests shall be made in a room or compartment free from air drafts. The operator shall avoid breathing over the surface of the oil. It is desirable that the room or compartment may be darkened sufficiently so that the flash may be readily discernible.

Note

Aroclors 1248, 1254, 1260, and higher chlorinated Aroclors do not have a distinct flash or flame point below their boiling temperatures.

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