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METHOD FOR THE COMPARISON OF ADDITIVES FOR PORTLAND CEMENT CONCRETE

CAUTION: Prior to handling test materials, performing equipment setups, and/or conducting this method, testers are required to read **"SAFETY AND HEALTH"** in Part 2 of this method. It is the responsibility of the user of this method to consult and use departmental safety and health practices and determine the applicability of regulatory limitations before any testing is performed.

SCOPE

The procedure used for comparing samples of concrete additives with an infrared spectrophotometer is described in this test method. This test method is divided into two parts.

1. Sample Preparation
2. Safety and Health

PART 1. SAMPLE PREPARATION

A. APPARATUS

1. Infrared spectrophotometer, with printer and sample holding accessories.
2. Wig-L-Bug amalgamator, with stainless steel capsule, 12-mm diameter, cap, and steel balls
3. Laboratory Press Model P-21, Pasadena Hydraulics, or other press with a capacity of over 110 000 N or similar device.
4. Vacuum oven
5. Disposable aluminum weighing dish, 65-mm wide and 17-mm deep.
6. Evacuable pellet press
7. Alkali halide window, 25-mm diameter, 4-mm thick.

B. PROCEDURE

1. Liquid Sample Preparation:

   a. Liquid samples should not be evaporated directly in the vacuum oven. Instead, place 1 to 3 ml of the liquid sample in an aluminum dish. Then, place the aluminum dish in a conventional oven at 50 to 60˚C, for an overnight period. This should remove most of the moisture in the sample.

   b. Place the aluminum dish containing the partially dried sample in a vacuum oven at 60˚C and gradually increase the vacuum to 100 kPa. Some materials may froth or foam excessively at this point, and it may be necessary to allow a small amount of air to bleed into the oven to control the frothing and to remove any last traces of moisture or volatile material.

   c. After the sample has stabilized, close the air-bleed valve on the oven and continue drying. Generally, 3 h of drying in a vacuum oven, at 100 kPa, is sufficient.

d. Remove the sample from the oven and carefully transfer it to an agate mortar. Grind the sample to pass a standard 180-µm sieve, and return it to the vacuum oven at 100 kPa for approximately 1 h.

2. Solid Sample Preparation:

   a. Depending on their composition, solid samples may be handled in several ways. As an example, if the sample is a soluble resinous material, it may be possible to dissolve a portion in solvent and evaporate the solution directly on an alkali halide disk.

   b. Non-soluble solids should be ground into pieces and dried overnight in an aluminum dish in the vacuum oven at 60˚C and 100 kPa.

3. Remove the sample from the oven. Grind 2 mg of the sample with 250 mg of infrared grade potassium bromide, KBr, until it forms a uniform mixture. This breaks up any lumps of KBr and provides a preliminary mix to the specimen.

4. Transfer the mixed material, plus one steel ball, to a Wig-L-Bug capsule and vibrate the sample for 30 to 60 s.

5. Being careful that the steel ball is not also transferred, transfer the powdered pellet specimen to the evacuable press, and follow the manufacturer's instructions to prepare a suitable disk. Thoroughly clean the die after each use. Be careful to avoid damaging the polished die faces.

6. Place the disk in an infrared spectrophotometer and collect the transmittance spectrum.

   Test results are used for comparison purposes only. Each spectrum is compared with samples run previously. Two materials are considered similar if all of the absorption peaks match as to wave length and relative magnitude.

PART 2. SAFETY AND HEALTH

This method may involve hazardous materials, operations, and equipment. This method does not purport to address all the safety problems associated with its use. It is the responsibility of the user of this method to consult and establish appropriate safety and health practices and determines the applicability of regulatory limitations prior to use.

Prior to handling, testing or disposing of any of waste materials, testers are required to read the Caltrans Laboratory Safety Manual. This manual contains information on general safety principles, standard operating procedures, protective apparel, disposal of materials and how to handle spills, accidents, emergencies, etc. Users of this method do so at their own risk.

REFERENCES:

Caltrans Laboratory Safety Manual
California Test 416

End of Test (California Test 416 contains 2 pages)