



# Standard Test Method for Nonvolatile Matter of Agricultural Adjuvant Solutions by Thermogravimetry<sup>1</sup>

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## 1. Scope

1.1 This test method covers the determination of the non-volatile matter of agricultural tank mix adjuvant solutions by thermogravimetry.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

2.1 *ASTM Standards:*

E 473 Terminology Relating to Thermal Analysis<sup>2</sup>

E 1131 Test Method for Compositional Analysis by Thermogravimetry<sup>2</sup>

E 1519 Terminology Relating to Agricultural Tank Mix Adjuvants<sup>3</sup>

## 3. Terminology

3.1 *Definitions:*

3.1.1 *nonvolatile matter, n*—the matter remaining after heating an agricultural adjuvant solution at  $50 \pm 2.5^\circ\text{C}$  for 16 h.

## 4. Summary of Test Method

4.1 This test method is an empirical technique using thermogravimetry in which the mass of an agricultural adjuvant, heated at a controlled rate in an appropriate environment, is recorded as a function of time and temperature. Nonvolatile matter is the mass remaining after heating at a specific time and temperature.

## 5. Significance and Use

5.1 This test method is intended for use in quality control, material screening, and related problem solving where a nonvolatile content is desired or a comparison can be made with a known material of the same type.

5.2 The parameters described may be altered to suit a

particular analysis, provided the changes are noted in the report.

## 6. Apparatus

6.1 *Aluminum Weighing Dishes*, flat bottom, 70 mL capacity.

6.2 *Analytical Balance*, with a sensitivity of 0.01 g.

6.3 *Desiccator*.

6.4 *Drying Oven*, gravity convection-type, capable of maintaining a temperature of  $50 \pm 2.5^\circ\text{C}$ . If many determinations of solvent-based adjuvants are being made at the same time, an explosion-proof oven should be used.

## 7. Procedure

7.1 Bring the material to be tested to equilibrium temperature at  $25 \pm 5^\circ\text{C}$ .

7.2 Dry two flat-bottomed aluminum weighing dishes in an oven at  $50 \pm 2.5^\circ\text{C}$  for 1 h. Allow the dishes to return to ambient temperature in a desiccator.

7.3 Weigh each dish, making the determination in duplicate. Record the weight of the weighing dish to the nearest 0.01 g.

7.4 Add approximately  $2.0 \pm 0.1$  g of agricultural adjuvant solution to the aluminum weighing dish. Record the total weight of the sample and dish to the nearest 0.01 g.

7.5 Place the dish in an oven at  $50 \pm 2.5^\circ\text{C}$ . Maintain this temperature for  $16 \text{ h} \pm 5 \text{ min}$ . Begin timing when the oven has returned to temperature after loading.

7.6 After heating is complete, place the dish in a desiccator and allow it to return to ambient temperature.

7.7 Weigh the dish and sample to the nearest 0.01 g.

## 8. Calculation

8.1 Calculate the percent nonvolatile matters, using the following equation:

$$S = \frac{R - T}{W - T} \times 100 \quad (1)$$

where:

$R$  = final weight of residue and pan, g,

$T$  = tare weight of pan, g, and

$W$  = initial weight of sample and pan, g.

## 9. Precision and Bias

9.1 Duplicate determination should not differ by more than 0.5 % of the mean value.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee E-35 on Pesticides and is the direct responsibility of Subcommittee E35.22 on Pesticide Formulations and Application Systems.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 14.02.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 11.05.

**10. Keywords**

10.1 adjuvant; agriculture; nonvolatile matter; pesticide; solids; thermogravimetry

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