



Standard Test Method for Relative Extensional Viscosity of Agricultural Spray Tank Mixes¹

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1. Scope

1.1 This test method covers the determination of the relative extensional viscosity or Screen Factor (SF) of dilute agricultural spray mixes.

1.2 The test can be used for tank mixes containing dissolved, emulsified or dispersed materials, or mixtures.

1.3 Results may be affected by the quality of the water used. Make-up water quality should therefore be specified in the presentation of results.

1.4 Proper safety and hygiene precautions must be taken when working with pesticide formulations to prevent skin or eye contact, vapor inhalation, and environmental contamination. Read and follow all handling instructions for the specific formulation and conduct the test in accordance with good laboratory practice.

NOTE 1—References to the development of extensional viscosity from dissolved polymers, extensional viscosity effects on the droplet size distribution of sprays, and measurements of screen factor on recirculated spray mixes containing polymers are available.^{2,3}

1.5 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.6 *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.*

¹ This test method is under the jurisdiction of ASTM Committee E35 on Pesticides, Antimicrobials, and Alternative Control Agents and is the direct responsibility of Subcommittee E35.22 on Pesticide Formulations and Delivery Systems.

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² Dexter, R. W., "Measurements of Extensional Viscosity of Polymer Solutions and its Effect on Atomization from a Spray Nozzle," *Atomization and Sprays*, Vol 6, 1996, pp. 167–191.

³ Zhu, H., Dexter, R. W., Fox, R. D., Reichard, D. L., Brazee, R. D., and Okzan, H. E., "Droplet Size and Viscosity Effects in Recirculated Polymer Spray Solutions," *J. Agric. Engr. Res.*, Vol 67, 1997, pp. 35–45.

2. Referenced Documents

2.1 ASTM Standards:⁴

D1193 Specification for Reagent Water

E609 Terminology Relating to Pesticides

E1116 Test Method for Emulsification Characteristics of Pesticide Emulsifiable Concentrates

2.2 CIPAC Documents:

CIPAC Monograph 1 (Instructions for the preparation of hard water)

CIPAC Method MT 18.1.1 to 18.1.7 (Instructions for the preparation of standard waters)

3. Terminology

3.1 Definitions:

3.1.1 *screen factor, (SF)*—the ratio of the flow time of a test fluid (t_p) to the flow time of water (t_w) through the screen viscometer apparatus.

3.1.2 *extensional viscosity, (E)*—a measure of the resistance of a fluid to distortion by a stretching force.

4. Significance and Use

4.1 Extensional viscosity is a measure of the resistance of a liquid to stretching forces, such as those occurring during the disruption of liquid films and the formation of sprays used in agriculture and other purposes including painting operations or metal working. This method for measurement of a Screen Factor, gives a relative value for extensional viscosity, which may be used:

4.1.1 To compare the potential for drift control of different polymers.

4.1.2 To compare the relative extensional viscosity component of different spray tank mixtures.

4.1.3 To determine the extent of breakdown of polymer solutions used as drift control additives during the recirculation of the solutions through pumps and screens.

4.1.4 To use as a parameter in the Spray Drift Task Force Models for droplet size prediction.

⁴ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.