



# Standard Test Method for Identification of Oils and Oil Acids in Solvent-Reducible Paints<sup>1</sup>

This standard is issued under the fixed designation D2245; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the U.S. Department of Defense.*

## 1. Scope

1.1 This test method covers the identification of oils and oil acids in vehicles that have been separated from solvent-reducible paints. The test method is based on a gas chromatographic technique (of the methyl esters) applicable to products containing both saturated and unsaturated, animal and vegetable, unpolymerized or partially polymerized fatty acids having 8 to 20 carbon atoms.

1.2 This test method is not applicable to products containing fatty acids that have been polymerized or oxidized to such an extent that no characteristic monomeric fatty acids remain.

1.3 *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:*<sup>2</sup>

[D1398 Test Method for Fatty Acid Content of Alkyd Resins and Alkyd Resin Solutions](#) (Withdrawn 2007)<sup>3</sup>

[D1983 Test Method for Fatty Acid Composition by Gas-Liquid Chromatography of Methyl Esters](#) (Withdrawn 2003)<sup>3</sup>

[D2372 Practice for Separation of Vehicle From Solvent-Reducible Paints](#)

[D2800 Test Method for Preparation of Methyl Esters From Oils for Determination of Fatty Acid Composition by Gas-Liquid Chromatography](#) (Withdrawn 2007)<sup>3</sup>

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.21 on Chemical Analysis of Paints and Paint Materials.

Current edition approved June 1, 2011. Published June 2011. Originally approved in 1964. Last previous edition approved in 2005 as D2245 – 90 (2005). DOI: 10.1520/D2245-90R11.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

## 3. Summary of Test Method

3.1 This test method is based upon the differential migration and partitioning of constituent fatty acids in the form of vaporized methyl esters between a flowing gas phase and a supported liquid phase in a gas chromatographic column. The test method is based on isothermal operation of the gas chromatograph and a hot wire, thermal conductivity detector.

3.2 The test method consists in the separation of the vehicle from the paint by centrifugation, extraction of fatty acids from the vehicle after saponification, conversion of fatty acids and a measured addition of margaric acid (internal standard) into methyl esters, preparation of the gas chromatogram, and interpretation of the chromatogram. The amount of each monomeric fatty acid ester is calculated, totaled, subtracted from 100 % to yield polymerized fatty acids, reported as is, and interpreted by comparison with standards as being from specific oils or oil acids.

## 4. Significance and Use

4.1 This test method provides a procedure to identify the fatty acids present in the vehicle of a paint.

## 5. Apparatus

5.1 *Centrifuge,*

5.2 *Separatory Funnels,* with PTFE-fluorocarbon stop-cocks.

5.3 *Gas Chromatograph and Accessories,* suitable for analysis of fatty acids as methyl esters (see Test Method [D1983](#)).

## 6. Reagent

6.1 *Hydroquinone.*

## 7. Calibration and Standardization

7.1 Establish optimum operating conditions on the gas chromatograph with known samples of methyl esters as described in Test Method [D1983](#).

7.2 Prepare working standards by running known paints or vehicles through the procedure described in Section 8. Include

**TABLE 1 Fatty Acid Composition of Oils Used in Paint Products<sup>A</sup>**

Caster Oil, %		Oiticica Oil, %	
Palmitic	2	Palmitic	7
Stearic	1	Stearic	5
Oleic	7	Oleic	6
Ricinoleic	87	Licanic	78
Linoleic	3	Hydroxy acids	4
Coconut Oil, %		Perilla Oil, %	
Caproic	trace	Palmitic	7
Caprylic	6	Stearic	2
Capric	6	Oleic	13
Lauric	44	Linoleic	14
Myristic	18	Linolenic	64
Palmitic	11	Safflower Oil, %	
Stearic	6	Myristic	trace
Oleic	7	Myristoleic	trace
Linoleic	2	Palmitic	8
Linolenic	trace	Palmitoleic	trace
Cottonseed Oil, %		Stearic	3
Capric	trace	Oleic	13
Lauric	trace	Linoleic	75
Myristic	1	Linolenic	1
Myristoleic	trace	Arachidic	trace
Palmitic	29	Gadoleic	trace
Palmitoleic	2	Soybean Oil, %	
Stearic	4	Myristic	trace
Oleic	24	Palmitic	11
Linoleic	40	Stearic	4
Arachidic	trace	Oleic	25
Linseed Oil, %		Linoleic	51
Palmitic	6	Linolenic	9
Palmitoleic	trace	Arachidic	trace
Stearic	4	Gadoleic	trace
Oleic	22	Tall Oil, <sup>B</sup> %	
Linoleic	16	Palmitic	5
Linolenic	52	Stearic	3
Arachidic	trace	Oleic	46
Gadoleic	trace	Linoleic	41
Menhaden Oil, %		Linolenic	3
Lauric	trace	Arachidic	2
Myristic	7	Tung Oil, %	
Myristoleic	trace	Palmitic	4
Palmitic	16	Stearic	1
Palmitoleic	16	Oleic	8
Stearic	2	Linoleic	4
Oleic	15	Linolenic	3
Linoleic	7	Eleostearic	80
Linolenic	2		
Arachidonic	17		
Clupanodonic	11		
Nisinic	4		
Shibic	1		
Unidentified unsaturate	2		

<sup>A</sup> The acids and percents presented in this table are taken from the "Composition and Constants of Fatty Acids" chart and used by permission of the Archer-Daniels-Midland Co.

<sup>B</sup> The percent rosin acids in tall oil may vary from 0 to 42 %, the percent terpenes from 0 to 13 %. Both variations depend on the grade and refining of the oil.

particularly compositions with chemical or structural modifications that might be expected to alter the fatty acid distribution or the apparent polymer content of the starting raw materials.

## 8. Procedure

8.1 Separate the vehicle from the paint by direct high-speed centrifuging (see Practice [D2372](#)).

8.2 Extract the fatty acids from the separated vehicle after saponification and removal of the dicarboxylate salts and unsaponifiable matter in accordance with Test Method [D1398](#), but substitute separatory funnels with PTFE-fluorocarbon stop-

cocks when available. In cases involving unsaturated fatty acids, add a crystal or diethyl ether solution of hydroquinone (equivalent to less than 0.05 weight % of the fatty acids to the fatty acid fractions obtained in the Procedure Section, Method B, of Test Method [D1398](#)). Swirl the flask containing the fatty acids, some ether solvent, and the hydroquinone until the hydroquinone is well dispersed; evaporate off the remaining ether carefully under vacuum as described in Test Method [D1398](#). Analyze immediately or store for only a limited time in a small tall form vial under nitrogen in a dark cool place.

8.3 Prepare methyl esters of the extracted fatty acids in accordance with the Procedure Section of Test Method [D2800](#).