



Standard Test Method for Oil Absorption of Pigments by Gardner-Coleman Method¹

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1. Scope

1.1 This test method covers the determination of oil absorption of pigments by the Gardner-Coleman procedure.²

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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:*

D 234 Specification for Raw Linseed Oil³

D 281 Test Method for Oil Absorption of Pigments by Spatula Rub-Out⁴

3. Summary of Test Method

3.1 A soft paste is formed by the dropwise addition of linseed oil to the gently stirred pigment. The amount of oil required to form the paste is used to calculate an oil absorption value.

4. Significance and Use

4.1 The oil absorption value obtained by this test method provides information about the vehicle demand of the pigment when it is used in a pigment paste. Oil absorption values can be used to characterize batches of a given pigment.

4.2 This test method differs from Test Method D 281 in that D 281 requires a vigorous rubbing action whereas this test method involves only a gentle stirring and folding of the pigment. Because the end points are different, the values obtained from the two test methods generally differ.

5. Apparatus and Materials

5.1 *Balance*, capable of weighing to 0.01 g.

5.2 *Glass Container*, round-bottom, having a capacity of 250 mL ($\frac{1}{2}$ pt), or a low-form 250-mL beaker.

5.3 *Buret*, graduated in 0.1-mL divisions.

5.4 *Spatula*, sharp-edged steel, having a blade 15 or 20 by 100 mm ($\frac{1}{2}$ or $\frac{3}{4}$ by 4 in.).

5.5 *Linseed Oil*, Raw, conforming to Specification D 234 except that it shall have an acid number of 3 ± 1 .

6. Procedure

6.1 The weight of pigment used should correspond to a pigment volume of 3.0 ± 0.6 mL. Determine the weight needed by multiplying 3.0 ± 0.6 mL by the specific gravity of the pigment being tested. For example, a 20 g specimen normally is used for zinc oxide ($3.6 \text{ mL} \times 5.6 \text{ g/mL} = 20.2 \text{ g}$). Transfer the amount, weighed to 0.01 g, to the glass container.

6.2 Add oil from the buret at the rate of about 1 drop per second, stirring and “folding” the pigment continuously with the spatula during the addition. Try to provide dry pigment for the oil to strike. Do not rub or grind; as the particles of pigment become wetted, they collect in small lumps that gradually coalesce. As the coalescence proceeds, reduce the rate of oil addition by at least half. The end point is reached when the lumps, with a rolling action from the spatula, collect into a single ball or the excess of oil smears the wall of the container.

7. Calculation

7.1 Calculate the oil absorption, A , as follows:

$$A = \frac{M \times 0.93}{P} \times 100 \quad (1)$$

where:

M = oil, mL, and

P = pigment, g.

0.93 represents density of oil (in grams per millilitre). Express as grams of oil per 100 g of pigment.

8. Report

8.1 Report the oil absorption of the pigment as grams (pounds) of oil per 100 grams (pounds) of pigment.

9. Precision and Bias

9.1 On the basis of an interlaboratory study of this test

¹ This test method is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.24 on Physical Properties of Liquid Paints and Paint Material.

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² See Gardner, H. A. and Coleman, R. E., “Oil Absorption of Pigments,” *Scientific Section Circular 85*, Paint Manufacturers’ Assoc. of the United States, February 1920.

³ *Annual Book of ASTM Standards*, Vol 06.03.

⁴ *Annual Book of ASTM Standards*, Vol 06.01.