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TITANIUM DIOXIDE

DETERMINATION OF BRUSHED 325 MESH GRIT, SLURRY

METHOD: T4400.300.05

1. Principle
   Ultimate brushed grit in titanium dioxide slurry is defined as the percentage of the contained solid titanium dioxide which has not and will not disperse by wet screening and brushing to disperse soft agglomerates. The residue on the screen is dried and weighed.

2. Applicability

   2.1. General
   This method is applicable to water slurries of titanium dioxide.

   2.2. Specific
   The method applies to the determination of brushed +325 mesh grit in titanium dioxide slurry grades primarily for paint application. The grit found by this method represents hard pigment particles or foreign matter which will not pass through a 325 mesh sieve by working with a 1/2 inch camel hair brush. It is used for specification and as in-process measurements.

   This method is revised to be similar to the unbrushed grit procedure and for ISO clarification.

3. Limitations
   None

4. Sensitivity, Precision, and Accuracy

   4.1. Sensitivity
   No data is available.

   4.2. Precision

      4.2.1. Single Operator
      The average analysis ($\bar{x}$), standard deviation (s), and 95% confidence limits (95% CL) established for the single operator precision of the method were as follows:

	$\bar{x}$	s	95% CL
% Brushed grit	0.0011	0.0002	± 0.0005

      The above data were calculated from 8 replicate analyses of one sample performed by one technician over a period of a few days.

      4.2.2. Multiple Operator
      The average analysis ($\bar{x}$), standard deviation (s), and 95% confidence limits (95% CL) established for the multiple operator precision of the method were as follows:

	$\bar{x}$	s	95% CL
% Brushed grit	0.0018	0.0016	± 0.0033

      The above data were calculated from 32 replicate analyses of one sample performed by 8 technicians over a period of a few weeks.

   4.3. Accuracy
   No data is available. However, long-term operating experience has been satisfactory.

5. Special Apparatus (Equivalent apparatus may be substituted)

5.1. Sieve, paint pigment, ASTM 325 mesh, 3-inch, National Institute of Standards and Technology, Series No. 325, 3-inch. VWR Scientific, No. 57377-009. Order from local VWR Scientific Sales Office.

5.2. Top loading balance capable of measuring 200 ± 0.1 g.

5.3. Analytical balance.

5.4. Disposable cold drink cups, at least 300-mL capacity; obtain locally.

5.5. Special Apparatus (Equivalent apparatus may be substituted) (Cont.)

5.6. Camel hair balance brush, 1/2 inch flat (with 1/2 the length of the bristles cut off), Fisher Scientific, Cat. No. 03-665A.

5.7. Electric convection oven, not forced air, for 110 ± 5°C.

6. Reagents (Reagent grade except as noted)
None

7. Special Safety Considerations

7.1. Product Hazards
There are no unusual product hazards. Normal care to prevent dusting, eye contact or skin contact is suggested. Wipe up all spills with a damp paper towel. For more information, refer to MSDS #2816CR.

7.2. Procedure Hazards
Use care with glassware. Check for chips and cracks before using.

Use tongs or gloves when handling hot equipment.

8. Procedure

8.1. Operating Conditions
Not applicable.

8.2. Calibration
Not applicable.

8.3. Sampling
Samples are normally supplied by manufacturing. Slurries should be tested promptly because changes in properties can occur with time.

8.4. Sample Analysis

8.4.1. Determine percent solids of the slurry sample using the method described in T4400.570.01.WP (formerly TP-508.1).

8.4.2. On top loading balance, tare a clean paper cup or beaker containing approximately 100 mL of distilled water.

8.4.3. Weigh 200 ± 1 g of slurry into the paper cup or beaker containing the water, using care not to get any dried solids from the rim of the slurry container into the slurry in the cup.

8.4.4. Slowly pour diluted slurry into a clean 3-inch, 325 mesh sieve. Occasionally tap the sieve frame lightly to aid the passage of the fines through the sieve.

NOTE: Visually inspect 325-mesh sieve for holes, tears or any other damage before use.

8.4.5. Thoroughly rinse the paper cup or beaker with distilled water and pour rinsings through the sieve. Rinse until all pigment and grit are removed from the cup, adding all washings to the sieve.

8.4.6. While water is running over the residue, using a 1/2 inch camel hair brush, brush very lightly, using only the tips of the bristles to break up any soft lumps of pigment which might be present. Continue until no pigment streaks form on the screen during brushing and the underflow water is clear. No work other than that done by the tips of the camel hair bristles is to be done on the pigment. The brushing is only done to break up the soft lumps so that the fines will pass through the sieve and the grit will remain behind on the sieve.

8.4.7. Dry the sieve and contents in a 110 ± 5°C oven for ~30 minutes or until dry. Do not dry in a forced draft oven or at temperature higher than 115°C. Soft solder used in the construction of the sieves might soften and allow the wire cloth to separate from the sieve frame.

8.4.8. Remove sieve from oven and cool to room temperature in a desiccator. Use tongs or gloves to handle the hot sieves.

8.4.9. Transfer dried residue from the sieve to a tared weighing dish using a dry camel hair brush.

8.4.10. Weigh the residue (and the dish) on an analytical balance to the nearest 0.0001 g and record the weight.

Alternate steps may be used:

8.4.11. 9a. Weigh the cool sieve containing solids on an analytical balance to the nearest 0.0001 g and record the weight.

8.4.12. 10a. Brush the dried residue from the sieve using a dry camel hair brush.

8.4.13. 11a. Reweigh the empty sieve and calculate and record the difference as the weight of grit.

8.5. Calculations

8.5.1. Calculate percent grit (TiO_2 basis) as follows.

$$\%\, Brushed\ Grit = \frac{weight\ of\ grit}{0.02 \times \%\, solids\ of\ slurry}$$

This formula was derived from the more general formula which is written:

$$\%\, Grit = \frac{weight\ of\ grit \times 100}{sample\ wt. \times \frac{\%\, solids}{100}}$$

9. Quality Control
No slurry samples with known grit are available for Statistical Process Control procedures.

10. Comments

10.1. General
None

10.2. Specific
None

11. References

11.1. General

11.1.1. ASTM Method D 185-84.

11.1.2. ASTM Method D 476-84.

11.1.3. MSDS No. 2816CR.