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Ti-Pure®

TITANIUM DIOXIDE

DETERMINATION OF UNBRUSHED 325 MESH GRIT, SLURRY

METHOD: T4400.300.01

1. Principle

A slurry sample of known percent solids is diluted with water. The slurry is transferred to a 325-mesh sieve. The undersize is washed through the sieve with an unspecified volume of water. The oversize is dried, weighed, and reported as unbrushed +325 mesh grit.

2. Applicability

2.1. General

This method is used to determine the percent unbrushed +325 mesh grit in a slurry of titanium dioxide.

2.2. Specific

This method is used to determine the percent unbrushed grit of a rutile slurry which is the total of the hard grit (brushed) and the soft agglomerates. The method can be used for process control and product specification.

This method was revised to be similar to the brushed 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
% 325 Mesh Grit	0.0076	0.0014	± 0.0027

The above data were calculated from eight replicate analyses of one sample performed by one technician over a period of several 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
% 325 Mesh Grit	0.0081	0.0016	± 0.0031

The above data were calculated from twenty replicate analyses of one sample performed by five technicians over a period of several days.

4.3. Accuracy

No data are available; however, our experience with the test has been satisfactory.

5. Special Apparatus (Equivalent apparatus may be substituted)

- 5.1. Sieve, Paint Pigment, ASTM 325 mesh, 3 inch, National Bureau of Standards Series No. 325., 3 inch diameter. VWR Scientific No. 57377-009. Order from local VWR sales office.
- 5.2. Electric convection oven at  $110 \pm 5^{\circ}\text{C}$ , not forced air.
- 5.3. Camel's hair balance brush. Fisher Scientific Co., ½ inch, " Flat Camel Hair Brush", Cat. No. 03-665A.
- 5.4. Analytical balance.
- 5.5. Top loading balance (capable of weighing  $200 \text{ g} \pm 0.1 \text{ g}$ ).
- 5.6. Disposable cold drink cups, at least 300 mL capacity. Obtain locally.
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
    - 7.2.1. Use care with glass ware. Check for cracks and chips before using.
    - 7.2.2. 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 a top loading balance tare a clean paper cup or beaker containing approximately 100 mL of distilled water.
    - 8.4.3. Weigh  $200 \pm 1 \text{ g}$  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

- 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 onto the sieve. Rinse cup or beaker until all pigment and grit are removed, adding all washings to the sieve.
- 8.4.6. Wash sieve with a gentle stream of water until underflow is clear.
- 8.4.7. Wash residue to one side of the sieve.
- 8.4.8. Dry sieve in a  $110 \pm 5^\circ\text{C}$  oven (not forced air) for at least 30 minutes or until dry.
- 8.4.9. Remove sieve from oven and cool to room temperature in a desiccator. Use tongs or gloves to handle the hot sieve.
- 8.4.10. Transfer the dried residue to a tared weighing dish using a dry camel's hair balance brush.
- 8.4.11. Weigh the residue (and dish) on an analytical balance to the nearest 0.0001 g. and record weight.

Alternate steps may be used:

- 8.4.11. a. Weigh the cool sieve containing the solids on an analytical balance to the nearest 0.0001g. and record the weight.
- 8.4.12. a. Brush the dried residue from the sieve using a dry camel hair brush.
- 8.4.13. a. Reweigh the empty sieve and calculate and record the difference as the weight of grit.

## 8.5. Calculations

- 8.5.1. Calculate percent grit ( $\text{TiO}_2$  basis) as follows.

$$\% \text{Unbrushed Grit} = \frac{\text{weight of grit}}{0.02 \times \% \text{solids of slurry}}$$

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

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

## 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 D 185-84.

11.1.2. ASTM D 476-84.

11.1.3. MSDS No. 2816CR for Titanium Dioxide.