

T 665 cm-12

SUGGESTED METHOD – 1965
OFFICIAL TEST METHOD – 1983
REVISED – 1989
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CLASSICAL METHOD – 2002
REVISED – 2012
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Analysis of talc

1. Scope

This method covers the identification and the chemical analysis of talc.

2. Summary

Procedures are given for the following: identification by X-ray diffraction, loss on ignition, silicon dioxide, R_2O_3 group, calcium oxide, and magnesium oxide.

3. Significance

3.1 Pure talc is a hydrous magnesium silicate, $Mg_3Si_4O_{10}(OH)_2$, with a theoretical chemical composition of 31.7% MgO, 63.5% SiO_2 , and 4.8% H_2O . Unground it may be white, greenish, gray, or almost black, depending on the impurities present, but when ground, talc is normally white to grayish white.

3.2 Commercial talc may contain at least one of the following impurities: quartz, tremolite, kaolinite, serpentine, chlorite, muscovite, calcite, dolomite, and magnesite.

4. Apparatus, reagents, and materials

4.1 Any specialized apparatus, materials, and necessary reagents are included in the appropriate sections of the procedure.

4.2 All chemicals should be of reagent grade or better.

4.3 Water used in the procedure should be distilled or deionized.

4.4 A complete reagent blank run along with the sample is recommended, if the reagents are of suspect purity.

4.5 All weighings are to be performed on an analytical balance and recorded to four decimal places.

Approved by the Standard Specific Interest Group for this Test Method



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5. Sampling and test specimen

From each test unit of at least 400 g obtained in accordance with TAPPI T 400 "Sampling and Accepting a Single Lot of Paper, Paperboard, Fiberboard, or Related Product," grind approximately a 10-g specimen to -325 mesh (<44 µm) for X-ray diffraction.

6. Procedures

6.1 *Identification by X-ray diffraction.* X-ray diffraction is the recommended technique for identification. Infrared spectroscopy, thermal analysis, and specialized microscopy techniques are also satisfactory. Conclusions based on chemical analysis alone should be made with caution.

6.1.1 *Apparatus:* standard X-ray diffraction system.

6.1.2 Prepare the specimen of the ground talc as described by Klug and Alexander (1).

6.1.3 Obtain the diffraction pattern (1) of the specimen and the software generated d-spacings.

6.1.4 For identification purposes, Table 1 contains a listing of ICDD, International Centre for Diffraction Data, card citations as the primary card files to access talc and the common mineral contaminants mentioned in 3.2. These citations will provide the complete list of d-spacings for comparison to the specimen's d-spacings.

Table 1. X-ray diffraction data for identification (2)

Mineral	ICDD card citations		
Talc	13-558	19-770	29-1493
Chlorite	24-506	12-242	
Quartz	33-1161	46-1045	
Calcite	5-586	47-1743	
Dolomite	36-426		
Magnesite	8-479		

6.2 *Loss on ignition*

6.2.1 Accurately weigh approximately 1 g of the sample that has been dried for 1h at 105°C into a tared crucible. Ignite in a muffle furnace to constant weight starting at 400°C and gradually increasing to 1000°C. One hour at full heat is sufficient.

6.2.2 Allow the crucible and its contents to cool to ambient temperature, cool in a desiccator, and weigh.

6.2.3 Calculation:

$$\text{Loss on ignition, \%} = \frac{\text{Weight loss, g} \times 100\%}{\text{Sample weight, g}}$$

NOTE 1: EN ISO 12677:2011 is an alternate test method for % SiO₂, % CaO, MgO, and % R₂O₃.

6.3 *Silicon dioxide*

6.3.1 *Materials:*

6.3.1.1 *Balance*, 500-g capacity, accurate to 0.05 g.

6.3.1.2 *Balance*, analytical, accurate to 0.0005 g.

6.3.1.3 *Drying oven*, 105 ± 2°C.

6.3.1.4 *Platinum crucible with close fitting platinum lid*, capable of holding 1 g.

6.3.1.5 *Muffle furnace*, capable of maintaining 1000 ± 30°C.

6.3.1.6 *Desiccator*.

6.3.1.7 *Porcelain casserole*, capable of holding 600 mL.

6.3.1.8 *Watch glass*, sized to cover casserole.

6.3.1.9 *Hot-plate-type dryer*, sized to accommodate a 600-mL porcelain casserole.

6.3.1.10 *Platinum-tipped tongs*.

6.3.1.11 *Steam bath*.