



Title: Development of Method and Instrument for Measuring Burned (Black) Particles in Whey Powder Formed During the Spray Drying Process

Raman Kumar Matta¹, Dr. Pratibha Singh², Sandeep Tyagi³

¹Department of Biotechnology Maharaja Vinayak Global University Dand Amer Jaipur

²Department of Biotechnology Maharaja Vinayak Global University Dand Amer Jaipur

³Department of Pharmacy A.P.J Abdul Kalam Technical University Lucknow (Uttar Pradesh)

Abstract: This study presents the development of a novel method and instrument for quantifying burned (black) particles in whey powder resulting from the spray drying process. The method involves visual comparison of residual material on a filter disc to standardized grading criteria.

KEYWORDS- BPT (Black Particle Tester)

Introduction: The presence of burned particles in whey powders serves as an important indicator of both raw material quality and processing conditions during manufacturing. Lower levels of burned particles are associated with improved reconstitution behavior of whey powder.

Materials (Instrument Details): The developed instrument comprises a Black Particle Tester, stainless steel sediment test filters, and a funnel assembly. These components facilitate accurate and reliable testing of whey powder samples.

The procedure involves preparing whey powder samples, filtering them through test filters, and visually comparing the remaining material on the filters to standardized black particle grading standards. Results are interpreted based on the grading scale.

✧ **Full unit (uses test filters) -** Black Particle Tester, Stainless steel uses test filters with black flush.



✧ **Full unit (uses test filters)** Black particle tester ,stainless steel uses sediment test filters ,with black flush.



- ◇ **Full unit (uses test filters)- Test Filter ,1-1/4 Inc round for black particle testing,**



- ◇ **Parts -**

1. Body Assembly for sediment test card (including screen).



2. Water jet (Aspirator) with faucet adapter (Brass coloured end connects to faucet).



3. Funnel -





❖ **Body Assembly with test card-**

1. Body Assembly (Including screen) with sediment testing card inserted.



2. Bottom of funnel with test card inserted into body assembly.



❖ **Full Assembly with test card-**





❖ **Consumables -**

1. Test Filters Cards - These cards can be used for whey powder testing. Each one is made from the same specifications .Each card has slightly different reporting format. (specific fabric).
2. This Card with filters is designed for all types of standard whey powders used in industry of specifications (Fat 0.1 % to 10 %),Protein (10 % to 92 %)



❖

- ❖ **Standards (Examples)-** Black particles standard photo available.



Grade-1

Grade-2

Grade- 3

Grade-4

Grade-5

❖ **PROCEDURE-**

- . Measure 250 ml of sediment-free water in a 1-liter blender. The water temperature should be between 8 to 15°C.
- . Add 30 g of whey powder to the blender.
- . Add approximately 0.5 ml of anti-foaming agent if required.
- . Stir vigorously just before pouring the mixture into the tester.
- . Place the sediment test card with filters in the sediment tester. Adjust the funnel, then start the water supply and pour the sample into the funnel.
- . Rinse with 50 ml of sediment-free water, and pour it into the funnel again.
- . Stop the water supply and remove the sediment test card. Place it to dry at 30°C.
- . Compare the dry disc, placed on a table and viewed from directly above, with the black particle standard photo under uniform indirect light.
- . Any test failing between two standard discs should be assigned the higher disc's letter.
- . A disc showing more scorched particles than the standard filter Grade 1 but less than 2 should be assigned Grade 2, and similarly for other discs.
- . Use the Black Particle Standard Grade Disc filter for reference.



Grade 1

Grade 2

Grade 3

Grade 4

Grade 5



RESULTS: Compare the results with the original Standard chart. The comparison is visual, with the standard grades divided into a scale from 1 to 5, where:

- Grade 1: Less than 10 mg/serving (30g)
- Grade 2: Less than 25 mg/serving (30g)
-
- Grade 3: Less than 50 mg/serving (30g)
-
- Grade 4: Less than 75 mg/serving (30g)
-
- Grade 5: Less than 100 mg/serving (30g)
-

We have tested different samples such as Whey Protein Concentrate-80, Whey Protein Isolate-90, Sweet Whey Powder, and Whey Powder DM-40. Results are as follows:

[Attach pictures for reference]



Sweet Whey Powder



WPC-80%



WPI-90%



Whey Powder-DM-40

❖ **NOTE-** Please click the photo of black particles using mobile or camera. So that calculations can be easily counted and calculated.

❖ **REFERENCE-**

1. BIS13500 -1992
2. ADPI (American Dairy Product Institute)
3. Standard Method for the examination Dairy Product.
4. GEA Niro Researched Laboratory
5. ADPI, Bulletin 916 (Previously called ADMI , American Dry milk Institute)
6. Modification Of the Harland -Ashworth method ,Published by kuramoto ,Jeness coulter and Choi. Journal Of dairy Science 42:28,1928.