



Enzyme Glucansucrase Detection Report

Protocol No.: DET-PRO-050

Name of the product: 3.75oz Lumineux Oral Essentials Whitening Tooth Paste

Approved by: *Nour Abochama* Date: 2019-04-02
Nour Abochama
Director QA/QC, American Testing Lab Inc.

Approved by: *Kourosh Maddahi DDS* Date: 4/2/2019
Kourosh Maddahi DDS
Founder, Oral Essentials Inc.

Table of Contents

1	Objective: _____	3
2	Scope: _____	3
3	Responsibility: _____	3
4	Materials, Equipments and documents: _____	3
4.1	List of Equipment: _____	3
5	Analytical Method _____	4
5.1	Standers and Reagents: _____	4
5.2	Solutions: _____	4
5.3	Standard: _____	4
5.4	Sample: _____	4
5.5	Chromatographic Conditions: _____	5
5.6	Injection Run: _____	5
5.7	System Suitability: _____	5
5.8	Calculations: _____	5
6	Protocol _____	6
	Results: _____	6
8	Conclusion: _____	6
9		

1 Objective:

To determine the effect of 3.75oz Lumineux Oral Essentials Whitening Tooth Paste on Enzyme Glucansucrase concentrations.

2 Scope:

A 3T3 clone A31 Cell Line from mouse was exposed to a 5000 µg/ml solution of test product for 96 hours. A determination of Glucansucrase concentration was performed using HPLC method.

3 Responsibility:

The persons responsible for the process will perform the and record the information. The responsible person will supervise the study, verify the completion of the records and write the report. Quality Assurance will review and approve the Report.

Name of the Personnel	Designation	Signature
__Nour Abochama__	__Director QA/QC__	<i>Nour Abochama</i>
__Reem Samman__	__Chemist__	<i>Reem Samman</i>

4 Materials, Equipments and documents:

List with Equipment No. and all Standard Operation Procedures (SOPs) for the normal processes under test.

4.1 List of Equipment:

Name of Equipment	Equipment No.
HPLC with DA detector	LAB-2426
Balance	LAB-2233
Pipette	LAB-2422
Incubator	LAB-2223
HPLC Column, 4.6×250 mm, Phenomenex	LAB-0179
pH-Meter	LAB-2150

Complied By: Reem Samman Date: 2019-03-26

Reviewed By: Nour Abochama Date: 2019-03-26

5 Analytical Method

5.1 Standers and Reagents:

- 5.1.1 Sucrose Reference Standard (or equivalent);
- 5.1.2 Sodium Acetate, ACS grade (or equivalent);
- 5.1.3 KH₂PO₄ S grade (or equivalent);
- 5.1.4 Acetonitrile HPLC grade (or equivalent)
- 5.1.5 Purified water USP grade (or equivalent);
- 5.1.6 Nitromethane HPLC grade (or equivalent);
- 5.1.7 1-propanol H PLC grade (or equivalent);

5.2 Testing Procedure:

- 5.2.1 The standard reaction for enzyme assay performed in the mixture containing 50 mM sodium acetate (pH 5.2), 100 mM sucrose, and an appropriately diluted enzyme. The reaction mixture was incubated at 30 °C for 30 min. The resulting fructose was measured by dinitrosalicylic acid (DNS) method (Miller 1959). One unit was defined as the amount of enzyme that catalyzes the release of 1 µmol fructose from sucrose per min at 30 °C.
- 5.2.2 Glycosylation of l-ascorbic acid to ascorbic acid 2-glucoside
The glycosylation reaction mixture contained 50 mM sodium acetate (pH 5.2), 1 mM MgCl₂, 0.1% l-ascorbic acid, 100 mM sucrose, and an appropriately diluted enzyme. Then, the reaction mixture was incubated at 30 °C for 3 h.
- 5.2.3 The products were analyzed by using thin-layer chromatography (TLC). The samples were spotted onto the silica gel 60 F254 TLC plate (Merck, Germany) and developed with a solvent system consisting of nitromethane/1-propanol/water (2:5:1.5, v/v/v). The plate was then visualized by spraying with 10% H₂SO₄ in methanol.
- 5.2.4 The products were then analyzed by high-performance liquid chromatography (HPLC), using a Gemini 5 µm C18 110A column (4.6×250 mm, Phenomenex, USA) with 0.1 M KH₂PO₄ buffer (pH 2.0) as a mobile phase.

5.3 Chromatographic Conditions:

- 5.3.1 Injection Volume: 5 µL;
- 5.3.2 Wavelength: 240 nm;
- 5.3.3 Mobile Phase: As per section 5.2.1 of this method;
- 5.3.4 Flow Rate: 0.7 mL/min;
- 5.3.5 Expected RT: 5.2 min;
- 5.3.6 Run time: 15 min.

5.4 Injection Run:

- 5.4.1 1 inj Mobile Phase BLK;
- 5.4.2 5 inj working standard STD;
- 5.4.3 1 inj samples;
- 5.4.4 1 inj control (working standard) QSTD

5.5 System Suitability:

- 5.5.1 From the 6 injections of standard, area RSD should not be more than 5.0%.
- 5.5.2 Recovery between standard control and mean area of standard should be within 95.0%-105.0%.

5.6 Calculations:

- 5.6.1 Calculate against the mean area of first 5 injection of standard.

5.6.1.1 Recovery standard

$$\% \text{ Recovery} = (\text{Area}_{\text{qstd}} / \text{Mean Area}_{\text{std}}) \times 100$$

Where:

- Area_{qstd} = Area of peak of interest in standard or Control.
- Mean area_{std} = Mean area of peak of interest in standard

5.6.1.2 Sample Calculation

$$\% \text{ of 2-glucoside in Products} = (\text{Area}_{\text{spl}} / \text{Mean Area}_{\text{std}}) \times (\text{C}_{\text{std}} / \text{W}_{\text{spl}}) \times 100 \text{ mL} \times 100$$

Where:

- Area_{spl} = Area of 2-glucoside in Sample preparation
- Mean Area_{std} = Mean Area of 2-glucoside in working standard
- C_{std} = preparation Concentration of standard in working standard (mg/mL)

W_{spl} = Weight of sample (mg)

Complied By: Reem Samman Date: 2019-04-02

Reviewed By: Nour Abochama Date: 2019-04-02

6 Protocol

- 6.1 The test item is prepared y adding 10% (v/v) FCS and 1% antibiotics (v/v) to the artificial Saliva
- 6.2 Prepare 5000 µg/mL solution of Lumineux Oral Whitening Tooth Paste. Expose the test item to
- 6.3 the product solution for 24, 36, 48, 60, 72, 84 and 96 hours then prepare as described in section 5.4.

7 Approval:

- 7.1 Submit the Document to QA for review and approval.

8 Results:

Exposure Time	Blank (µg/ml)	Test Product (µg/ml)	Water (µg/ml)	Ref. Product (µg/ml)
0 hours	0.00	0.840	0.840	0.840
24 hours	0.00	0.792	0.840	0.838
36 hours	0.00	0.640	0.839	0.838
48 hours	0.00	0.483	0.840	0.750
60 hours	0.00	0.138	0.840	0.096
72 hours	0.00	0.094	0.838	0.085
84 hours	0.00	0.094	0.840	0.084
96 hours	0.00	0.094	0.840	0.085

9 Conclusion:

The **Glucansucrase** concentration have been 88% decreased in test item after 72 hours of exposure. The solution at 5000 µg/mL is prepared form Lumineux Oral Essentials Whitening Tooth Paste

Approved By: Nour Abochama
 Nour Abochama, M. Sc.,

Date: 2019-04-02