ANALYSIS REPORT

General information

Date: July 16, 2015.

Analysis number:	Q-110615F129
Client:	Ecoventur
Analysis period:	11-06-2015/13-07-2015
Test Description:	Accelerated Photodegradation

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I.- Sample Description:

A3. PET Boticario
Client: HP Embalagens
P-life PET

A4. PET to Johnson &Johnson
Client: HP Embalagens
P-life PET

II.- Objective:

Accelerated Degradation based on temperature of the structure and determination of its shelf life time. According to; "Tensile Test" ASTM D3826-98, "Standard Practice for Exposure of Photodegradable Plastics" ASTM D5208.

III.- Laboratory equipment:

a) Universal Testing Machine.
b) QUV accelerated weathering tester. Cycle: Continues of UV at 50°C and 0.70 W/m2.
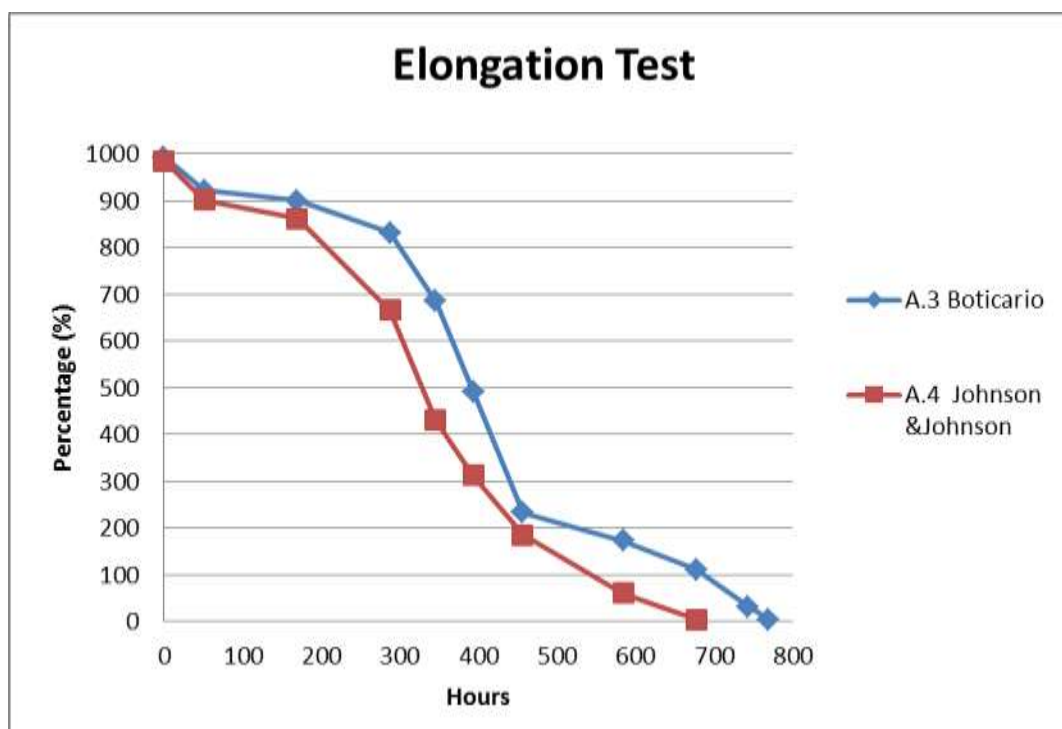
IV.- Results:

MECHANICAL PROPERTIES

For this study we decided to analyze the results of the elongation percent.

Days in the oven	Elongation (%)	
	A.3 Boticario	**A.4** Johnson &Johnson
0	993.23	985.34
51	921.67	901.46
169	900.15	862.32
287	832.35	666.35
345	685.23	430.51
393	491.52	312.24
456	232.74	185.45
584	172.65	60.24
677	110.93	4.35
743	31.35	-
769	4.85	

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QUALITATIVE ANALYSIS

	Stage	Sample	
		A.3 Boticario	A.4 Johnson &Johnson
	Stage	Days	
1	The sample enters to study.	0	0
2	Maintains Physical Properties.	14	11
3	The structure changes his initial properties (color, hardness)	17	14
4	The product is broken easily.	30	24
5	The degradation process has finished.	32	28
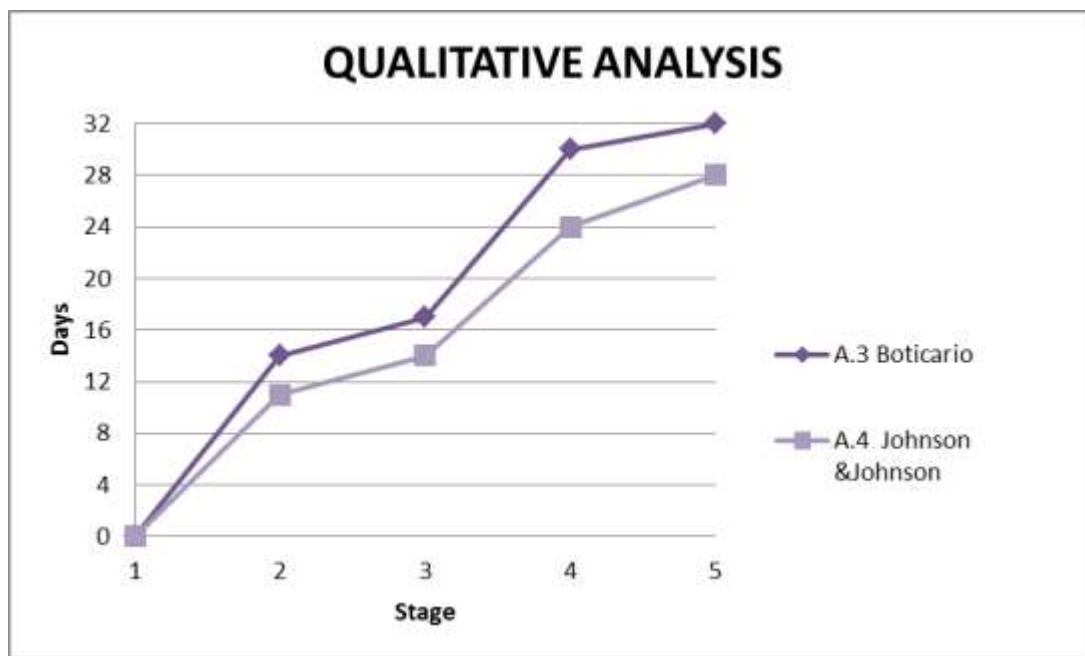
V.- Conclusions:

A3. Boticario

After exposing Sample M1 to the accelerated aging process, the change in mechanical and physical properties were also clearly observed.

It is considered that the period of useful life ends by losing more than 50% of the initial elongation percent that took place after 17 days of exposure. Therefore, it is determined that **a shelf life of Sample M1 is considered to be 42 months (3 year with 6 months) under 30°C warehouse environment.**

Based on ASTM D5510-94 is considered that the sample has reached its accelerated degradation, when it support less than 5% of elongation that happened after 32 days of study therefore we concluded that this sample has a **degradation time of 80 months (6 years with 8 months).**

Please be advised that 1 day of study shall be converted into 2.5 months under 30°C environment. The conversion rate is calculated based on Arrhenius Activation Energy.

Please be also advised that the determination of shelf life time as 50% retained property is based on our long term experiences we have been conducting a degradation test for a number of customers throughout the worldwide region.

A4. *Johnson &Johnson*

After exposing Sample M1 to the accelerated aging process, the change in mechanical and physical properties were also clearly observed.

It is considered that the period of useful life ends by losing more than 50% of the initial elongation percent that took place after 14 days of exposure. Therefore, it is determined that **a shelf life of Sample M1 is considered to be 35 months (2 years with 11 months) under 30°C warehouse environment.**

Based on ASTM D5510-94 is considered that the sample has reached its accelerated degradation, when it support less than 5% of elongation that happened after 28 days of study therefore we concluded that this sample has a **degradation time of 70 months (5 years with 10 months).**

Please be advised that 1 day of study shall be converted into 2.5 months under 30°C environment. The conversion rate is calculated based on Arrhenius Activation Energy.

Please be also advised that the determination of shelf life time as 50% retained property is based on our long term experiences we have been conducting a degradation test for a number of customers throughout the worldwide region.

Ing. Martha Castillo Cruz

ANNEX IMAGE

Illustration 0. Laboratory equipment

Illustration 1. Sample A3 (Boticario) in the universal machine before the study began.
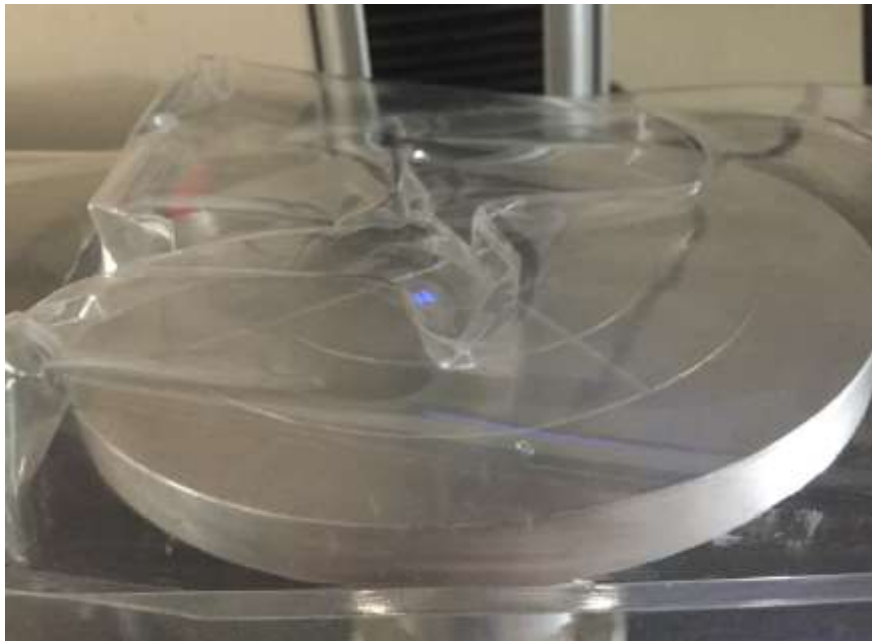
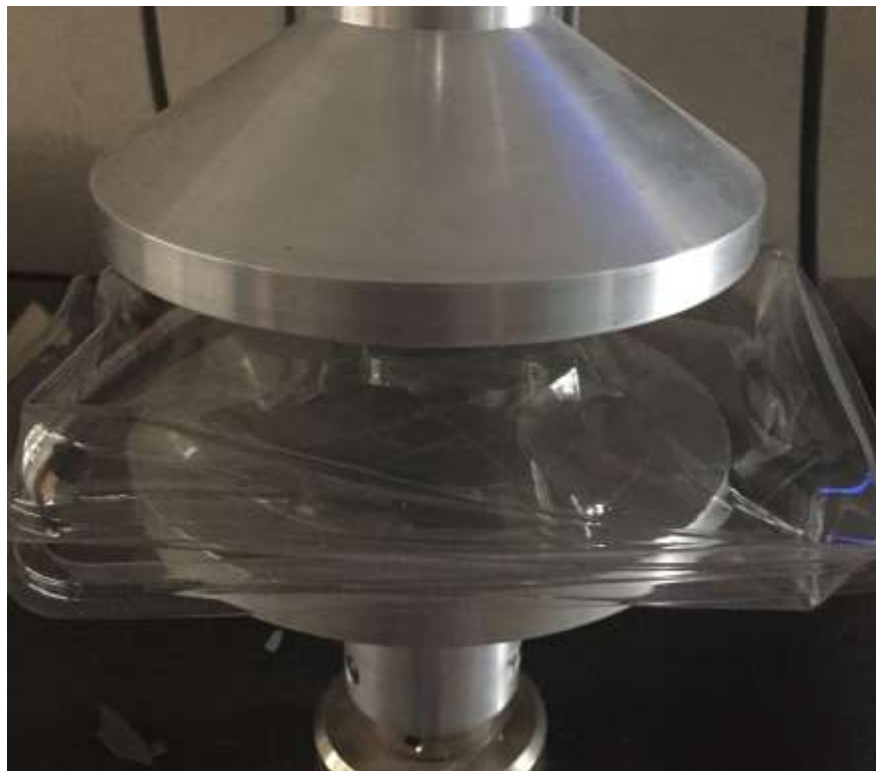Illustration 2. Sample A3 (Boticario) after 14 days of study.

Illustration 3. Sample A3 (Boticario) after 17 days of study

Illustration 4. Sample A3 (Boticario) after 30 days of study.

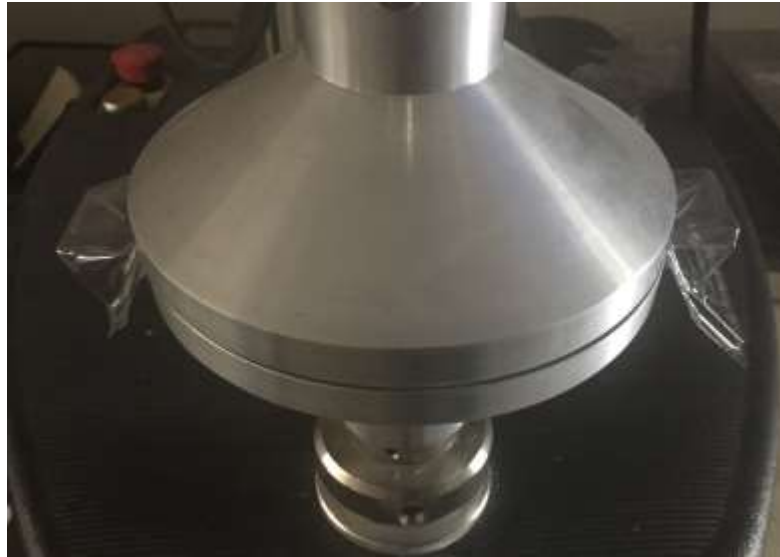Illustration 5. Sample A3 (Boticario) after 32 days of study.

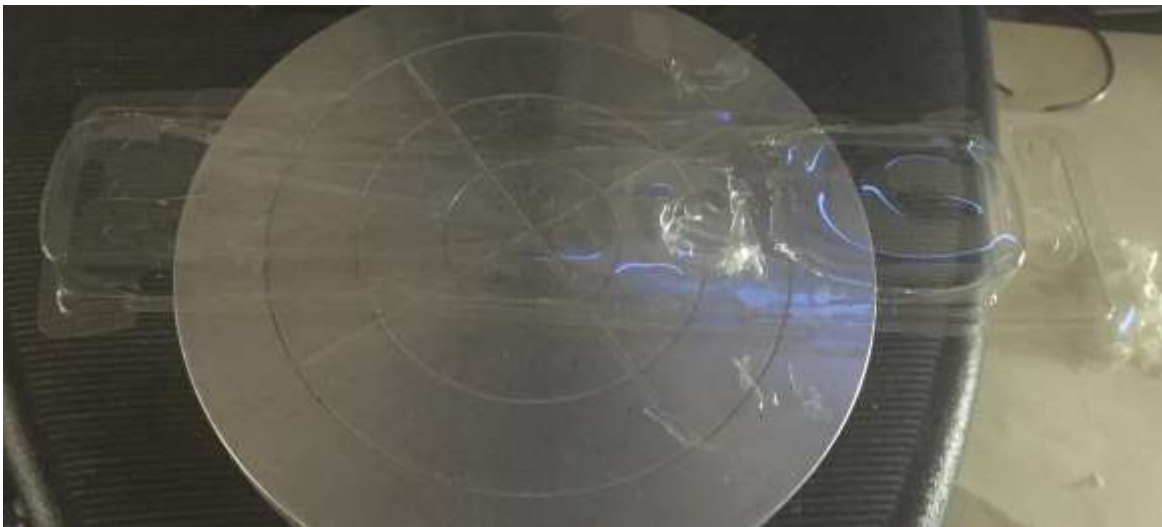Illustration 6. Sample A4 (Johnson) in the universal machine before the study began.

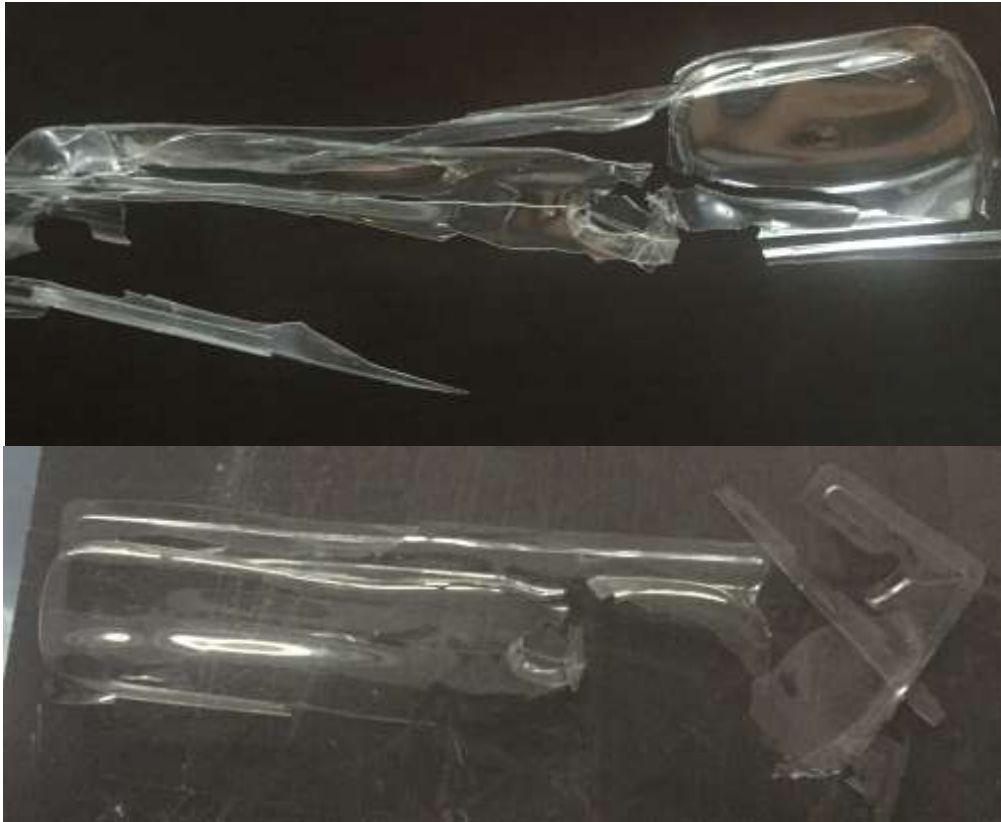Illustration 7. Sample A4 (Johnson) after 14 days of study.

Illustration 8. Sample A4 (Johnson) after 24 days of study

Illustration 9. Sample A4 (Johnson) after 28 days of study