



# Carbon-14 Testing: Measuring Biobased Content of Personal Care Products

*Haley Gershon; Beta Analytic*

*Miami, FL*

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## Introduction of research

This presentation will focus on how manufacturers and distributors in the cosmetics industry will benefit from measuring the biobased content of their personal care product ingredients. How can companies obtain and use the valuable data that carbon-14 testing provides during the formulation of their products? What will the results of biobased content testing reveal about the composition of your products? We will also discuss how to use biobased testing to qualify eligible products for biobased certification programs and eco-labels which are easily recognizable by consumers, allowing them to identify plant-based products on the market.

## Body

Environmentally conscious consumers are becoming increasingly aware of the sources and types of ingredients used to develop their personal care products. More and more, consumers are seeking out and opting for products composed of plant-based ingredients that are more eco-friendly.<sup>1</sup> Manufacturers and distributors in the personal care industry are beginning to transition away from the use of petrochemical-derived material. Instead, they are using biobased ingredients in response to consumer demands. Carbon-14 testing is a method used to validate biobased claims by determining the percentage of biobased content in a product's ingredient composition.

## Carbon-14 Testing Methodology

Carbon-14, also known as radiocarbon, is a radioactive isotope that is found in all living organisms and biomass. Petrochemical (fossil) material older than 50,000 years does not contain any carbon-14 content. Therefore, the Carbon-14 (or radiocarbon dating) method can be used to determine the amount of carbon-14 content present in a given sample and identify whether it contains fossil material. Carbon-14 testing is performed according to ASTM D6866, a standard test method developed specifically for biobased content determination that requires radiocarbon dating. The method is applicable to materials in solid, liquid or gaseous form. Other standardized methods such as ISO 16620 and EN 16640 also utilize the radiocarbon dating method. Samples are combusted and converted into a solid graphite form before being pressed onto a metal disc and mounted onto a wheel of an accelerator mass spectrometer (AMS) machine for analysis. During analysis, the AMS instrument counts the amount of carbon-14 present.



### **What Should You Expect from the Results?**

Biobased testing through carbon-14 analysis reports results as percent biobased content. This percentage indicates the amount of ingredients coming from biomass sourced carbon versus fossil carbon. Products that are 100% sourced from biomass will generate a 100% biobased result. Alternatively, products sourced only from fossil fuel material will be 0% biobased. Any result showing percentages between 0% and 100% biobased indicates that the product is composed of a mixture of both biomass-derived and fossil fuel-derived materials and ingredients.

### **Why is Biobased Content Testing Important to the Personal Care Product Industry?**

The validation of biobased content during the product development stage allows manufacturers to transition their products to biobased content over time by phasing out and substituting fossil fuel content with renewable ingredients from biomass. Third-party verification of a product's biobased content acquired via testing acts as a verification method for fraud prevention and a communications tool, promoting biobased content to consumers to increase product appeal. Carbon-14 testing is also often required by several biobased eco-label and certification programs such as the USDA BioPreferred Program.

### **Conclusion**

Biobased testing for personal care products helps manufacturers and distributors validate the biobased content of their products in response to increasing consumer interest in natural products. Testing also can be used to monitor the process of phasing out fossil-derived ingredients as companies transition to the use of more renewable ingredients. In addition, testing provides the means to visibly display the use of biobased ingredients through certifications and eco-labels, several of which require carbon-14 testing for biobased content as part of their application process.

### **References**

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1 Grand View Research, *Natural Cosmetics Market Size, Share, Trends Analysis Report By Product (Skin Care, Hair Care, Fragrance, Color Cosmetics), By Distribution Channel (Supermarket/Hypermarket, Online), And Segment Forecasts, 2019 - 2025*,  
<https://www.grandviewresearch.com/industry-analysis/natural-cosmetics-market>



### About the speaker



Haley Gershon, Marketing Manager for Beta Analytic, joined the company in 2018. Her primary role involves leading marketing projects on an international level for multiple laboratory services in addition to managing the company's Marketing and Customer Support teams. Haley has an environmental science background with a double degree in Ecosystem Science & Policy and Political Science plus a Sustainability Certificate from the University of Miami.