

# Eniva Research Group

## **Research Initiative: Bio-based Content Calculation of the Eniva VIBE Nutraceutical Through Radiocarbon Dating (2005)**

To Whom It May Concern:

The Eniva Corporation and Eniva Research Group take great pride and care in the formulation and manufacturing of its wellness products. We are dedicated to producing products that are safe, quality driven, effective, and innovative. To accomplish this, we subject our products and the product development process to serious review and rigorous testing.

This letter explains the results and rationale behind the bio-based content calculation, as evidenced through radiocarbon dating of the Eniva VIBE product. With the development of the nutritional products industry, more and more companies are claiming “plant based” ingredients and products, but provide very little documentation to verify the authenticity of this claim.

To address this issue, the Eniva Research Group chose to radiocarbon date the Eniva VIBE product to determine its BIO-BASED and FOSSIL components.

The basis of radiocarbon dating has at its core the fact that Carbon-14 (C14) originates in the upper atmosphere of the earth. It is constantly being created and starts to decay as soon as it is formed. This constant cycle leaves the amount of C14 in the air relatively constant. It then reacts with oxygen in the air to form carbon dioxide (CO<sub>2</sub>). This carbon dioxide rapidly mixes throughout the atmosphere, where at ground level it is consumed by plants during photosynthesis. This process is constantly ongoing, such that at any point in time, the amount of C14 in living plants is the same as the amount of C14 in the air around them.

Living plants are an active component of the overall food chain. Animals eat plants, animals eat animals, and humans eat plants and animals. Therefore all living plants, animals and human beings have the same amount of C14 in their bodies at the same time. Their bodies are said to be in “equilibrium” with C14 in the air. Although the C14 is radioactively decaying away in the body, it is constantly being replaced by new photosynthesis or the ingestion of food, leaving the amount relatively constant. Only when an organism dies does the replacement process of C14 cease. Since C14 is radioactive, it is this level that is then used to calculate age, based on C14 content.

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In radiodating, two terms are critical:

1. BIO – BASED (per parameters of radiocarbon dating): This term refers to materials that are derived in whole or part from biomass resources. In its simplest terms, this refers to substances that were once living material. Examples would be wood and crop residues and aquatic plants.
2. FOSSIL – BASED (per parameters of radiocarbon dating): A material that does not contain C14 or a significantly reduced amount when compared to a sample of the same time period. This indicates the fossil is either 50,000 years old or greater, or the material did not inherently contain C14. An example would be petroleum products or various types of minerals. Neither of these were ever living and do not contain C14.

As per the enclosed results, the Eniva Research Group chose to have the Eniva VIBE product radiodated by a leading radiocarbon dating laboratory. The Eniva VIBE product yielded the following:

- A Radiocarbon Date of 107.5 pmc, corresponding to current year.
- A Bio-based content of 87%.
- A Fossil based content of 13%.

Analyzing these results, one can confidently say that (at a minimum) 87% of the material present in the Eniva VIBE product came from material that was once living. Since the VIBE product does not contain animal products, it can then be further stated that:

***AT A MINIMUM, 87% OF THE MATERIAL FOUND IN THE VIBE PRODUCT WAS AT ONE TIME LIVING PLANT MATERIAL (or derivatives there of).***

The remaining 13% of the product is fossil based material. As the Eniva VIBE product does not use petroleum based products and has a high content of minerals, the fossil based portion can be accounted to by the presence of minerals.

The results of this study demonstrate the desire of the Eniva Research Group to communicate the content of the Eniva VIBE product.

Respectfully,

The Eniva Research Group





## CALCULATION OF BIOBASED CONTENT FROM RADIOCARBON MEASUREMENTS

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Laboratory Number:

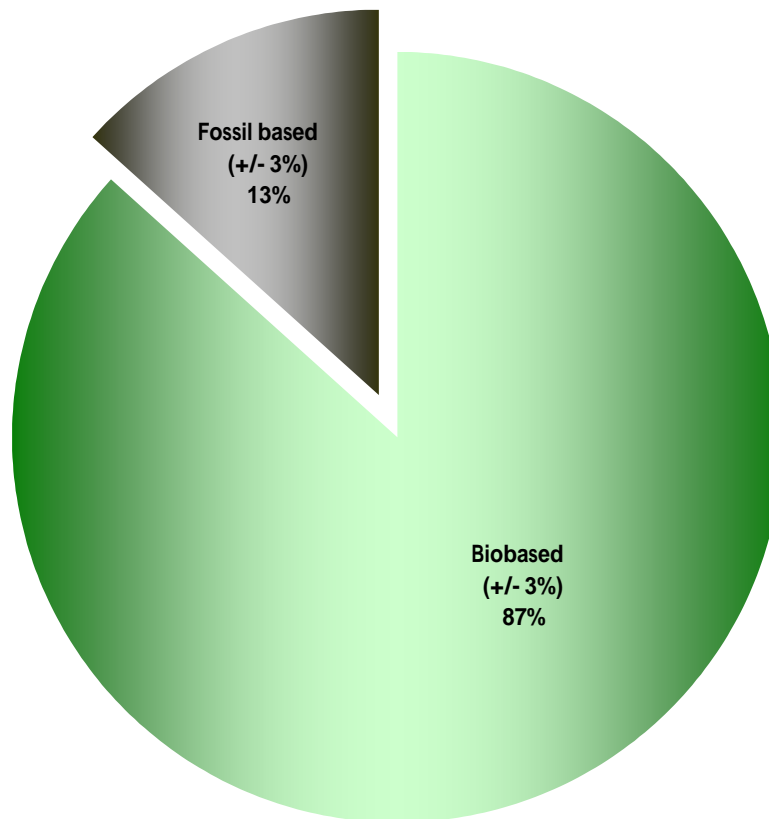
Submitter Number:

Material: FLUID

<b>Mean Biobased Result:*</b>	<b>87%</b>
<b>Apparent Biobased Content:*</b>	<b>84 - 90 %</b>

\* Biobased percentages were derived by presuming all the carbon components in the analyzed material were derived from plants or animals either respiring atmospheric carbon dioxide within the last few years of 2003 or were fossil in origin. An absolute uncertainty of +/- 3% is estimated for variation in both the modern and fossil endpoints to derive the APPARENT BIOBASED CONTENT. Mean Biobased Estimates greater than 100% and less than 103% are assigned a value of 100% for simplification. The most conservative interpretation of these results is that the Mean Biobased Estimate and Apparent Biobased Content represent maximum values. See the explanation page provided with this report for greater detail.

**Proportions Biobased vs. Fossil Based  
indicated by <sup>14</sup>C content**



Present Day Modern Reference: 107.5 +/- 2

Fossil Reference: 0.01 +/- 0.01 pMC

ASTM Method (D6866-04a): Method C

delta 13C (<sup>13</sup>C/<sup>12</sup>C ratio) : -23.3 o/oo