



ISO-17025 Accredited Testing Laboratory

PJLA ISO/IEC 17025:2005 Testing Accreditation # 59423

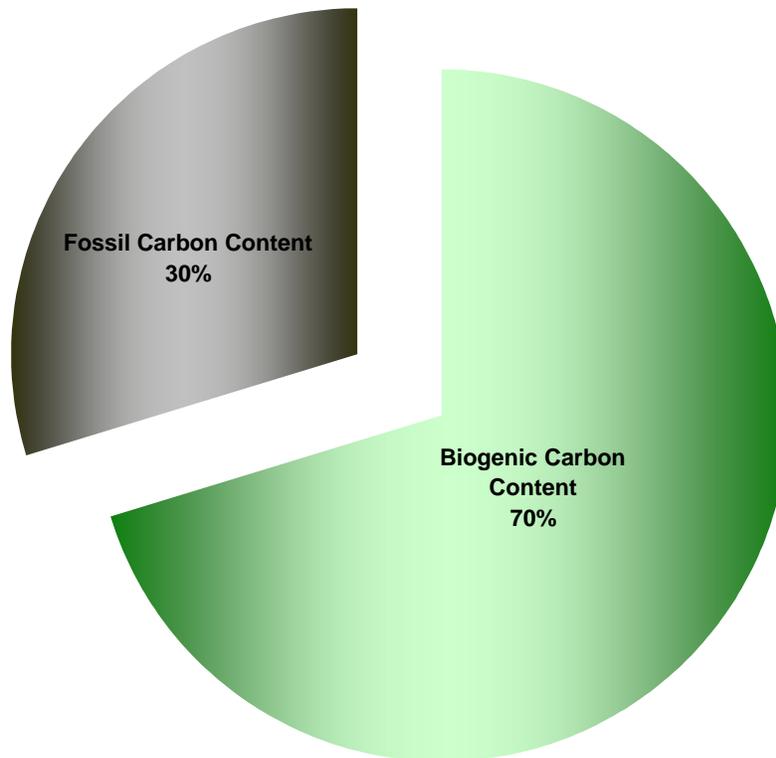
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CEN/TS 15747:2008 - Biogenic Carbon Content

Submitter: **BMH Technology of Finland**
Submitter Label: **BMH ENVIRO**
Laboratory Number: **Beta-261349**
Material Analyzed: **BIOCARBON SOLID**
Date Received: **June 26, 2009**
Date Reported: **July 3, 2009**

Mean Biogenic Carbon Content: 70% *

Proportions Biogenic vs. Fossil Carbon
indicated by ^{14}C content



* CEN/TS 15747:2008 cites precision on the mean biogenic carbon content as 5% relative standard deviation (RSD) for values between 0-10 % biogenic carbon content and 2 % RSD on values between 10-100 % biogenic carbon content. The result only applies to the analyzed material. Fluctuations in carbon content within a batch of product, fuel or flue gas must be determined separately (e.g. averaged measurements of multiple analyses or homogenization prior to submittal to the laboratory). The accuracy of the result as it applies to the analyzed product, fuel, or flue gas relies upon all the carbon in the analyzed material originating from either recently respired atmospheric carbon dioxide (within the last decade) or fossil carbon (more than 50,000 years old). "Percent biogenic carbon" specifically relates % renewable (or fossil) carbon to total carbon, not to total mass or molecular weight. Mean Biogenic Carbon Content estimates greater than 100% are assigned a value of 100% for simplification. The Mean Biogenic Carbon Content is the value used to calculate the biomass carbon content per the specifications of CEN/TS 15747:2008.



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Summary of Results CEN/TS 15747:2008 - Biogenic Carbon Content

Submitter: Mr. Rainer Rehn	Date Received	June 26, 2009
Company: BMH Technology of Finland	Date Reported	July 3, 2009

Laboratory Number	Submitter Label	Material	Method of Determination	Mean Biogenic Carbon Content*
Beta-261349	BMH ENVIRO	BIOCARBON SOLID	AMS	70%

* CEN/TS 15747:2008 cites precision on the mean biogenic carbon content as 5% relative standard deviation (RSD) for values between 0-10 % biogenic carbon content and 2 % RSD on values between 10-100 % biogenic carbon content. The result only applies to the analyzed material. Fluctuations in carbon content within a batch of product, fuel or flue gas must be determined separately (e.g. averaged measurements of multiple analyses or homogenization prior to submittal to the laboratory). The accuracy of the result as it applies to the analyzed product, fuel, or flue gas relies upon all the carbon in the analyzed material originating from either recently respired atmospheric carbon dioxide (within the last decade) or fossil carbon (more than 50,000 years old). "Percent biogenic carbon" specifically relates % renewable (or fossil) carbon to total carbon, not to total mass or molecular weight. Mean Biogenic Carbon Content estimates greater than 100% are assigned a value of 100% for simplification. The Mean Biogenic Carbon Content is the value used to calculate the biomass carbon content per the specifications of CEN/TS 15747:2008.



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Explanation of Results

Biogenic Carbon Analysis by CEN/TS 15747:2008

The application of CEN/TS 15747:2008 to derive a biocarbon content is built on the same concepts as radiocarbon dating, but without use of the age equations. It is done by deriving a ratio of the amount of radiocarbon (^{14}C) in an unknown sample to that of a modern reference standard. The ratio is reported as a percentage with the units "pMC" (percent modern carbon). If the material being analyzed is a mixture of present day radiocarbon and fossil carbon (containing no radiocarbon), then the pMC value obtained correlates directly to the amount of Biomass material present in the sample.

The modern reference standard used in radiocarbon dating is a NIST (National Institute of Standards and Technology) standard with a known radiocarbon content equivalent approximately to the year AD 1950. AD 1950 was chosen since it represented a time prior to thermo-nuclear weapons testing which introduced large amounts of excess radiocarbon into the atmosphere with each explosion (termed "bomb carbon"). This was a logical point in time to use as a reference for archaeologists and geologists. For an archaeologist or geologist using radiocarbon dates, AD 1950 equals "zero years old". It also represents 100 pMC.

"Bomb carbon" in the atmosphere reached almost twice normal levels in 1963 at the peak of testing and prior to the treaty halting the testing. Its distribution within the atmosphere has been approximated since its appearance, showing values that are greater than 100 pMC for plants and animals living since AD 1950. It's gradually decreased over time with today's value being near 107 pMC. This means that a fresh biomass material such as corn would give a radiocarbon signature near 107 pMC.

Combining fossil carbon with present day carbon into a material will result in a dilution of the present day pMC content. By presuming 107 pMC represents present day biomass materials and 0 pMC represents petroleum derivatives, the measured pMC value for that material will reflect the proportions of the two component types. A material derived 100% from present day soybeans would give a radiocarbon signature near 107 pMC. If that material was diluted with 50% petroleum derivatives, it would give a radiocarbon signature near 54 pMC.

A biogenic carbon content result is derived by assigning 100% equal to 107 pMC and 0% equal to 0 pMC. In this regard, a sample measuring 99 pMC will give an equivalent biogenic carbon content result of 93%. This value is referred to as the MEAN BIOGENIC CARBON CONTENT and assumes all the components within the analyzed material were either present day living (within the last decade) or fossil in origin.

The results provided in this report involved materials provided without any source information. This situation is highly probable in a real life situation. "Percent Biogenic Carbon" specifically relates % renewable (or fossil) carbon to total carbon, not to total mass or molecular weight. Mean Biogenic carbon content estimates greater than 100% are assigned a value of 100% for simplification. The reported mean biogenic result is the value to be used to calculate the biomass carbon content per the specifications of CEN/TS 15747:2008.