

ANALYSING BIOCHAR

Type of Carboniser: Flow Force Technologies Model 250M.

Type of process: Slow pyrolysis.

Typical process temperature v. time:

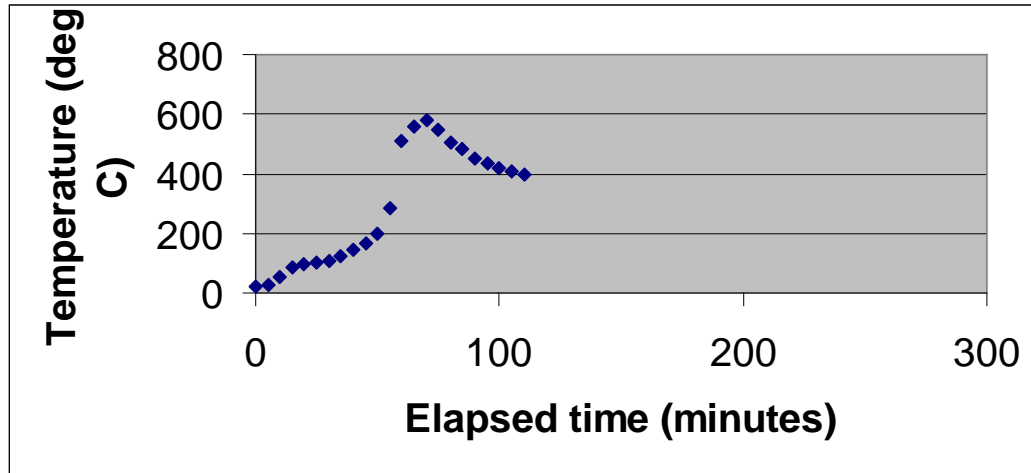


TABLE 1: PROXIMATE ANALYSIS OF BIOCHAR SAMPLES (AS RECEIVED)*

Test No.	Type of biomass used	Total Moisture (%)	Volatile matter (%)	Fixed Carbon (%)	Ash (%)
4	Hardwood pallets	62.7	6.1	25.9	5.3
6	Hardwood chips	21.3	15.7	59.1	3.9
7	Hardwood logs (wet)	67.6	5.7	21.7	5.0
8	Hardwood pallets	54.4	3.5	27.5	14.6
13	Green pine off-cuts	20.2	16.2	55.1	8.5
14	Green pine slats	12.0	19.9	55.5	12.6
15	Apple tree prunings	52.5	8.8	31.9	6.8
18	Mixed native off-cuts	61.0	6.0	30.8	2.2

Notes:

1. Biochar was dowsed with water on discharge to prevent combustion on contact with air. Therefore total moisture values are high and quite variable depending on drying time and ambient conditions before collection of sample. Samples were stored in airtight containers prior to analysis.
2. Fixed carbon content of each sample was determined by laboratory analysis.

ANALYSING BIOCHAR

TABLE 2: ANALYSIS OF BIOCHAR SAMPLES (DRY BASIS)

Test No.	Type of biomass	Volatiles + Carbon + Ash from Table 1	Volatile matter (%)	Fixed Carbon (%)	Ash (%)
4	Hardwood pallets	37.3	16.3	69.4	14.2
6	Hardwood chips	78.7	19.9	75.0	4.9
7	Hardwood logs (wet)	32.4	17.6	66.9	15.4
8	Hardwood pallets	45.6	7.6	60.3	32.0
13	Green pine off-cuts	79.8	20.3	69.0	10.6
14	Green pine slats	88	22.6	63.0	14.3
15	Apple tree prunings	47.5	18.5	67.1	14.3
18	Mixed native off-cuts	39	15.3	78.9	5.6
	Averages		17.26	68.7	13.9

CONCLUSIONS:

1. Average fixed carbon in the biochar produced is approx. 70% by weight. We expect that this can be increased to approx. 80% by taking steps to reduce the volatiles content from approx. 17% to 7% (e.g. by heating to a higher temperature).
2. Where biochar is to be made with a view to claiming carbon credits it will be necessary to use dry weights of biochar when calculating weight of carbon avoided; and dry weights of biomass when calculating carbon capture percentages. A drum weight measuring capability would be very useful in this regard so that (after allowing for weight of empty drum):
 - a) Initial weight = wet biomass weight.
 - b) Weight at onset of pyrolysis = dry biomass weight.
 - c) Weight at conclusion of pyrolysis = dry biochar weight.

ACKNOWLEDGEMENTS:

* Biochar analysis was carried out by an independent laboratory using samples provided by Flow Force Technologies.

Prepared by: Brian Lewis
Issue Date: 28 October 2011.