

# The Usage of Sludge from Banglen Water Treatment Plant to Produce the Compacted Charcoals



## 1. Abstract

The analytical result of sludge from the water treatment plant in term of energy shows that the sludge contains low heating value and low fixed carbon. That means the sludge is not directly suitable to be the fuel. Therefore, the experiment needs to increase the fuel's efficiency by mixing with cattail charcoals which is the agricultural product with decent heating value. The result of producing the compacted charcoals from sludge of the water treatment plant and cattail charcoals reveals that the optimum ratio is 1:4 by weight. By this ratio, the property of the compacted charcoals shows the heating value by 2,302 cal./gram and contains low ash comparing to other ratios. In case the proportion of sludge exceeds 1:4, the compacted charcoals will generate a lot of ash causing the removal difficulty.

## 2. Introduction

The process to treat the natural raw water always creates the sludge which is from the sedimentation process due to the chemical reaction with liquid alum and polymers. This process is carried out by Banglen Water Treatment Plant of TTW Public Company Limited with maximum capacity of 440,000 cubic meter/day. Our water treatment plant generates the sludge around 20 ton/day causing the difficulty in transportation and landfill.

## 3. Objectives

- 3.1 To produce the compacted charcoals from the sludge of the water treatment plant.
- 3.2 To study the property in term of energy of the compacted charcoals made of sludge and cattail charcoals.

## 4. Results

- 4.1 The optimum ratio by weight between sludge and cattail charcoals is 1:4, which leaves the minimum amount of ash but contains higher heating value.
- 4.2 To produce the compacted charcoals by mixing the sludge together can increase the strength and stability of the compacted charcoals, it also helps adhere and bind all materials in such compacted charcoals.
- 4.3 The compacted charcoals made of sludge and cattail charcoals still contains the lower heating value than traditional fuel.
- 4.4 There is a possibility to adapt the sludge to combine with other agricultural materials with higher amount of fixed carbon in order to create benefits from higher heating value in the future.

## Procedure

### 1. Study of the characteristic of materials

- Step 1 : Study the fuel-related property of sludge from the water treatment plant.
- Step 2 : Study the physical property of sludge from the water treatment plant.
- Step 3 : Analyze the total metal of sludge from the water treatment plant.
- Step 4 : Study the fuel-related property of cattail charcoals and water hyacinth charcoals.

### 2. Production

- Step 1 : Burning process
- Step 2 : Production trials to find the optimum ratio
- Step 3 : Analyze the break-down index by Drop Shatter Testing in accordance with ASTM D 3038



### 4. Application of the compacted charcoals

- Step 1 : Guideline to use the compacted charcoals together with wood charcoals for heating.
- Step 2 : Guideline to use the sludge for other purposes.

### 3. To utilize the compacted charcoals made of sludge and cattail charcoals

- Step 1 : The fuel-related property of the compacted charcoals
- Step 2 : To test the flammability and heating of the compacted charcoals

## 5. Suggestions

- 5.1 Even though the compacted charcoals from all different ratios has less heating value than the standard of green fuel, its quality can be improved by using the charcoals from other agricultural materials with higher heating value.
- 5.2 To utilize the heat from the compacted charcoals made of sludge and cattail charcoals together with wood charcoals shows that the wood charcoals help distribute the heat and enable the compacted charcoals to be easily ignited and also increase efficiency.
- 5.3 The compacted charcoals made of sludge and cattail charcoals have the property to absorb the odor.

Study of the characteristic of materials							
Sample	Ratio of Typha sludge:charcoal	Percentage					Heating Value (cal/g)
		Moisture	Ash	Volatiles Matters	Fixed Carbon	Total Sulfur	
T1	0 : 100	25.39	25.95	28.80	19.86	1.20	2,950
T2	10 : 90	27.72	35.65	22.91	13.72	1.80	2,251
T3	20 : 80	29.57	33.38	19.82	17.23	1.60	2,302
T4	30 : 70	29.19	34.71	19.56	16.54	1.50	2,213
T5	40 : 60	25.95	35.61	21.54	17.50	1.50	2,297
T6	50 : 50	23.09	37.47	23.17	16.27	1.30	2,168
T7	60 : 40	20.48	38.80	25.62	15.10	1.20	2,117
T8	70 : 30	20.36	38.82	27.27	13.55	0.92	2,062
T9	80 : 20	17.68	42.30	29.42	10.60	0.82	1,752
T10	90 : 10	16.30	42.64	30.82	10.24	0.49	1,695
S	100 : 0	15.45	42.74	35.72	6.09	0.10	1,581
TCPS standard	Green fuel	20-40	4-20	18-40	40-60	-	3,000-4,000

