Processing of coconut shell into activated carbon/charcoal

Coconut shell, a by-product of copra processing, is a good material for activated carbon/charcoal (Fig. 1). Activated charcoal (charcoal activated with CO₂, water vapor, or chemical compounds) made of coconut shell has advantages compared to other materials (wood, rice husk, corn cob) because of its ability to absorb color or aroma. It is used as supporting material for food and non-food industries (processing of cooking oil, sugar, and chemical matter purification).

Generally, coconut production at farmer level is 1 ton/ha, with coconut shell by-products of 0.9 ton, which in turn can yield 0.36 ton of activated charcoal. Price of activated charcoal is Rp 4,246,379.00/ton (US$440.00), income obtained is Rp 1,528,696.00 (US$158.00).

Processing of activated charcoal

Materials and equipment

- Coconut shell
- Drum or burning sink (Fig. 2)
- Oven
- Plastic pail
- Crusher wood/iron
- Draining tray
- Distilled water
- Sieve, 100 mesh

Fig. 1. Coconut shell

Fig. 2. Drum or burning sink
Methods

- Separate and clean coconut shell from other materials, such as coconut fiber or soil.
- Sun dry.
- Burn dried coconut shell at burning sink or drum at 300-500 °C for 3-5 hours.
- Soak charcoal in chemical solution (CaCl₂ or ZnCl₂, 25%) for 12-18 hours to become activated charcoal.
- Wash charcoal with distilled/clean water.
- Spread on tray at room temperature to be drained.
- Dry in oven at temperature 110 °C for 3 hours.
- Crush or refine activated charcoal with crusher wood/iron into size of 100 mesh (Fig. 3).
- Pack activated charcoal in plastic.

Quality standard

Quality standard for activated charcoal determined by the Department of Industry, Indonesia with SII 0258-79 are as follows:

<table>
<thead>
<tr>
<th>Item</th>
<th>Quality requirement</th>
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<tbody>
<tr>
<td>Loss matter during burning at 950 °C</td>
<td>max 15%</td>
</tr>
<tr>
<td>Water</td>
<td>max 10%</td>
</tr>
<tr>
<td>Ash</td>
<td>max 2.5%</td>
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<tr>
<td>Absorbability on Iod solution</td>
<td>min 20%</td>
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</tbody>
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