

# REGENERATION OF SPENT BLEACHING CLAY

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Spent bleaching clay is a by-product of the palm oil refining industry. It is estimated that about 100 000 t or more of clay are utilized yearly in the refining process. In Malaysia, spent bleaching clay (SBC) is commonly disposed at landfills. However, such method of disposal has become increasingly unacceptable due to the potential environmental hazards and the rising cost of disposal. This has prompted urgency in innovating practical and economical ways in utilizing SBC. In addition to the palm oil industry, there is incentive to recover oil for technical purpose and re-use the clay for other adsorptive purposes.

Typically, SBC contains 17% to 35% of residual oil, metallic impurities and other organic

compounds. SBC with substantial oil content is suitable as ingredient for poultry and animal feed. However, removal of oil from SBC opens opportunity for myriad industrial applications such as special adsorbents and as building materials. This can be achieved by employing suitable method of regeneration to restore the adsorptive capabilities of the SBC. The process for the regeneration of SBC involves two stages (Figure 1): (a) recovery of oil from SBC and (b) heat-regeneration of de-oiled SBC.

## PRODUCTS

The technology in this information series results in regenerated spent clay with similar physical properties to the fresh clay (Figures 2 to 5). The important physical characteristics of the clays are

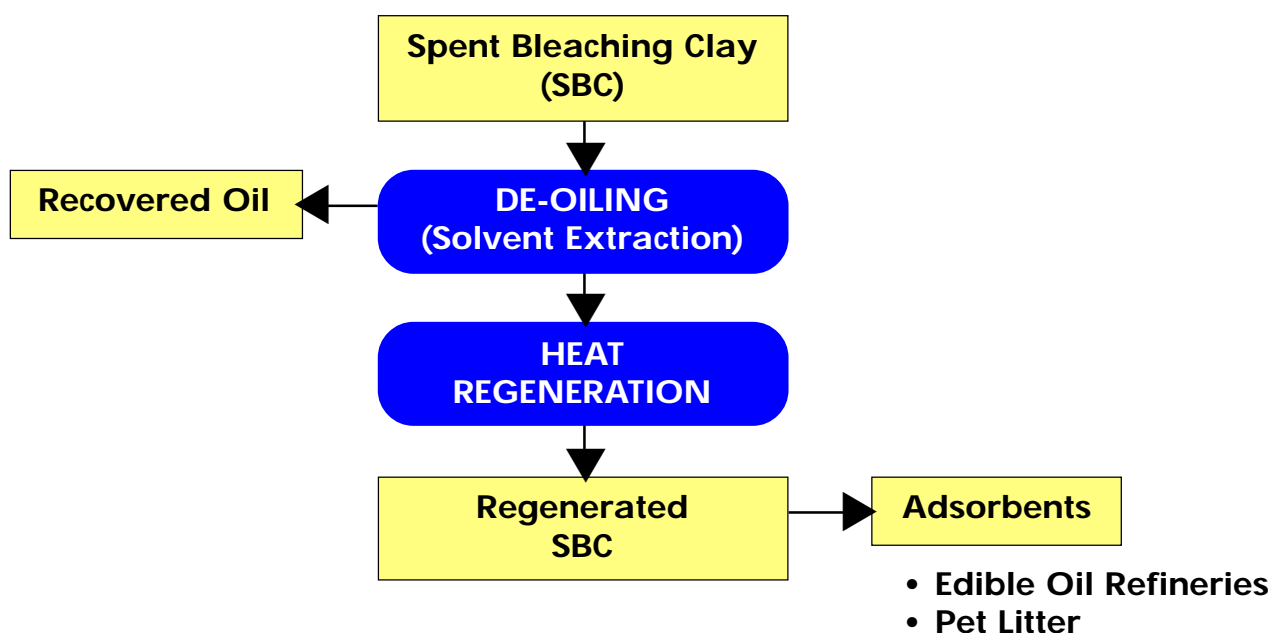


Figure 1. Regeneration process of spent bleaching clay (SBC).

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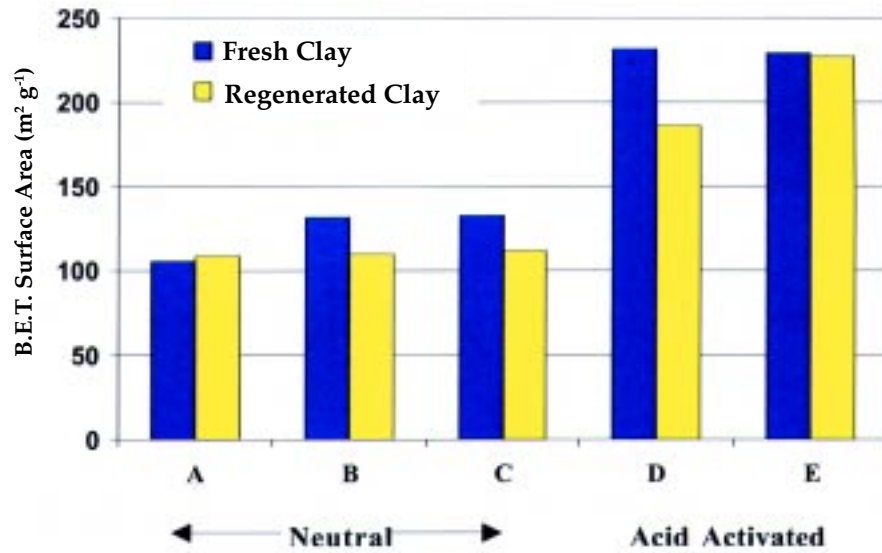


Figure 2. Surface area (B.E.T.) of regenerated spent bleaching clay (SBC) and fresh clay.

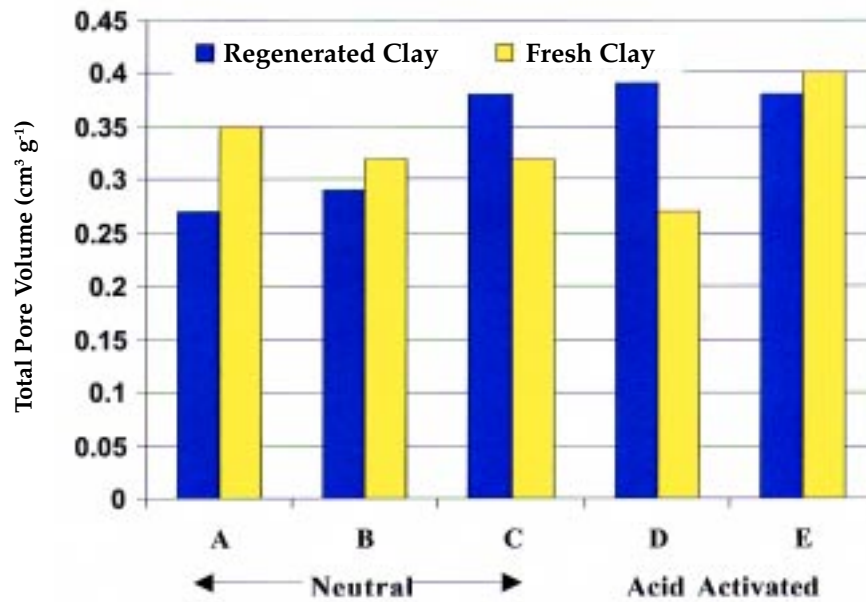


Figure 3. Total pore volume of regenerated and fresh clays.

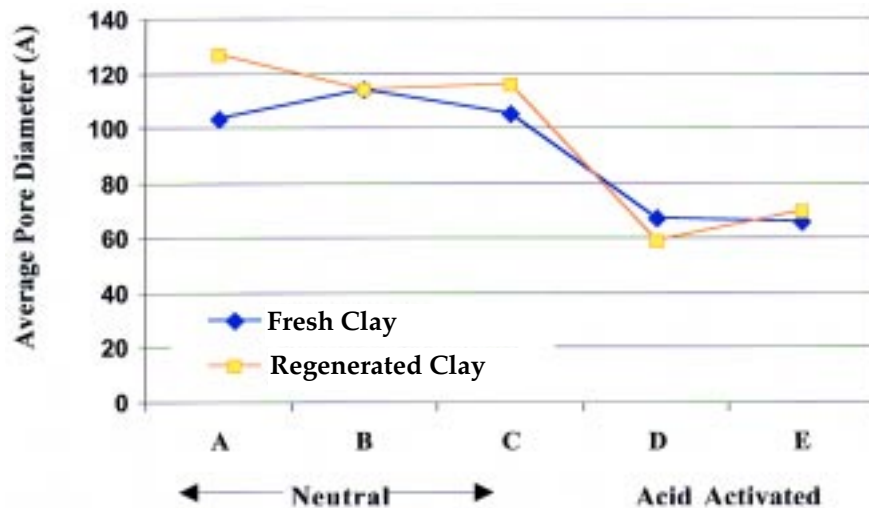
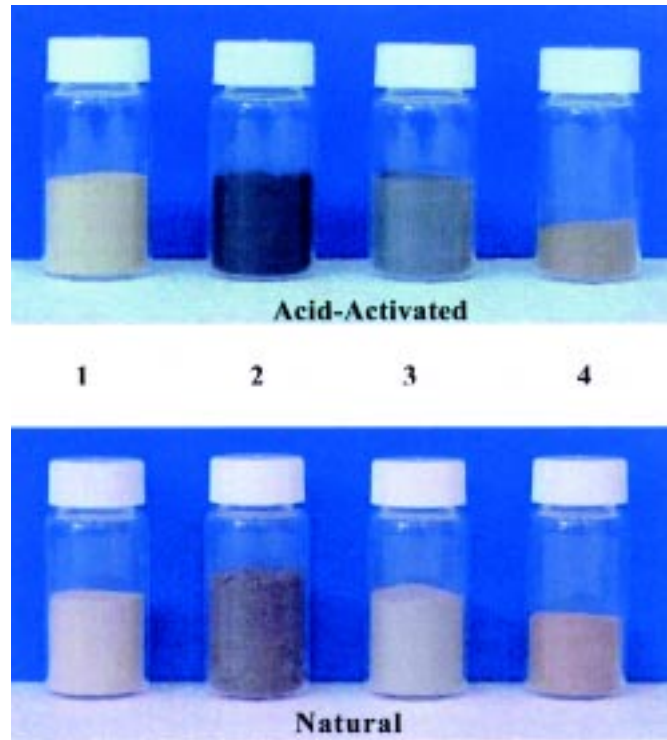


Figure 4. Average pore diameter of regenerated and fresh clays.



**Nomenclature:**

- 1 Fresh Bleaching Clay
- 2 Spent Bleaching Clay
- 3 Deoiled Spent Bleaching Clay
- 4 Regenerated Spent Bleaching Clay

Figure 5. Diagram of fresh, spent, deoiled and heat-regenerated of acid-activated and natural bleaching clays.

surface area (B.E.T), total pore volume and average pore diameter. The products upon regeneration may have effective properties suitable for vegetable oil refining. Table 1

highlights the performance of regenerated SBC in the bleaching of crude palm oil of different quality.

**TABLE 1. PERFORMANCE OF REGENERATED COMMERCIAL SPENT BLEACHING CLAY (SBC) ON DIFFERENT GRADES OF CRUDE PALM OIL (CPO)**

Type of CPO	Dosage (%)	Colour of RBD palm oil	
		Fresh earth	Regenerated earth
Poor	0.8	3.6 R 55.6 Y	5.1 R 66.7 Y
	1.5	2.6 R 66.7 Y	3.7 R 67.5 Y
Average	0.8	2.0 R 33.4 Y	1.6 R 54.7 Y
	1.5	1.5 R 56.5 Y	1.0 R 55.6 Y
Good	0.8	1.5 R 33.4 Y	1.2 R 56.5 Y
	1.5	0.7 R 23.2 Y	0.8 R 43.6 Y

Notes: Type of SBC – commercial bleaching earth (acid activated).  
Additive added prior to testing.

## ADVANTAGES

- Solves disposal problems;
- Promotes a *zero-waste* industry; and
- Reduces dependency on imports of bleaching clay.

## HIGHLIGHTS

- Simple processing involving two stages: deoiling and heat-regeneration;

- The process could restore the adsorptive capabilities of SBC without changing the original structure of the clay;
- Regenerated SBC has the potential to be re-used in the bleaching of crude palm oil; and
- The similar physical properties of regenerated SBC as compared to the fresh clay opens opportunity for more applications as industrial adsorbents.

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