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## **Residual Palm Oil Recovery from Empty Fruit Bunches and Palm Oil Mill Effluent**

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**Abstract.** Oil extraction rate (OER) is a universal indicator to measure the actual amount of oil obtained from the oil palm fresh fruit bunches (OPFFB) at palm oil mills. The maximum OER from a ripe oil palm fresh fruit bunch was estimated to be 30%. Over the past few decades, the OER has not made significant improvement and the reasons always being associated with soil, climate, oil palm species and age, poor milling operation and machine inefficiency. Not many efforts have been given to determine the oil loss in the palm oil wastes and wastewater as well as to recover it. The proof is over the years, the palm oil industry has not changed much in terms of its processing and design. Most of the process and machinery design in the mill are still using the same technology since 50 years ago. Therefore, there is an urgent need to provide a re-engineering solution for some of the processing especially to recover and reuse the residual oil. Palm oil mill effluent (POME) and oil palm empty fruit bunch (OPEFB) are main by-products generated from milling process, which contain high amount of residual oil. For instance, about 0.6 – 0.7 % residual oil was found in POME and about 15 – 28 % (dried weight basis) was found on OPEFB spikelet. High pressure water spray system and micro/nano-bubble system are eco-friendly combination method that can be employed to remove oil from OPEFB and separate oil from aqueous solution (oil-water obtained from OPEFB and POME), respectively. The aim of this research work is to evaluate the recovery and utilizing residual crude palm oil from waste streams of palm oil milling process for the production of any value added product (e.g. biodiesel).

**Keywords:** Residual palm oil, palm oil mill effluent (POME), oil palm empty fruit bunch (OPEFB), microbubble technology