

COLD SOAK FILTRATION TECHNOLOGY FOR PALM BIODIESEL

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The cold soak filterability test (CSFT) was introduced as one of the ASTM (American Society for Testing and Materials) D6751-09a specifications in 2009. This requirement is mandatory for all biodiesel sold and used as blending stock in the USA. The Malaysian Palm Oil Board (MPOB), through commercial experiences and know-how of the characteristics of palm biodiesel, has developed a technology that can help the existing biodiesel producers to meet the CSFT for palm biodiesel. In our earlier study, impurities that influence the CSFT of palm biodiesel have been identified (Lau and Choo, 2009). Lee *et al.* (2006) recently filed a patent application for a process involving filtration using diatomaceous earth to remove precipitates from biodiesel. Another patent application filed by Danzer *et al.* (2007) describes a process to remove steryl glycosides (SG) and other precipitates by cold treatment and filtration. However, these technologies may not be sufficient for treating palm biodiesel as there are other impurities present in palm biodiesel that need to be removed while SG is treated. The MPOB post-treatment CSFT technology for palm biodiesel will adequately remove all these impurities apart from SG to achieve consistent product quality which will ultimately meet the CSFT requirement for the US market.

COLD SOAK FILTERABILITY TEST

The purpose of ASTM in introducing CSFT is to control minor compounds in B100 biodiesel in order to ensure that cloud point is still an accurate measurement for B20 and lower blends. This test has nothing to do with the actual cold flow properties of the B100 or its blends as the results are independent of the cloud point of the B100. The test results have no direct implication on blends of biodiesel and diesel fuel. The test is conducted by measuring 300 ml of B100, chilled to 40°F (4.4°C) for 16 hr, allowed to warm up to room temperature, and filtered under vacuum using a 0.7 micron glass filter fibre with a stainless steel

support. Two limits have been set to categorize the B100 biodiesel: (a) B100 with less than 360 s filtration time, which will be fit for blending throughout the year, and (b) B100 which is intended for blending into diesel fuel and expected to give satisfactory vehicle performance at fuel temperatures at or below -12°C (+10.4°F) shall comply with a cold soak filtration limit of 200 s maximum. The basic testing equipment for CSFT is shown in *Figure 1*.



Figure 1. Equipment set-up for the cold soak filterability test. (a) Sample conditioning, (b) filtration system.

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TECHNOLOGY AND PRODUCTION COST

The MPOB CSFT technology is a post-treatment technology for palm biodiesel. It is a chemical treatment process by which palm biodiesel is subjected to mild reaction conditions, thus, can be done in existing biodiesel facilities. Stand-alone treatment facilities can also be incorporated if so desired. Only chemical and energy costs are incurred additionally in the overall treatment process.

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