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On the durability tests for handling of solid biomass such as wood pellets

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Biomass still remains an upcoming market in Europe driven by targets set by the European Commission. Numerous initiatives are taken to develop and produce new 'green' products such as torrefied pellets. While emphasis is on the product development side, the logistic chain concerning the handling and distribution of the products is often left out of consideration. Transport and storage of these products seems not to be an issue. However, looking at recent accidents in solid biomass handling (wood chips and wood pellets) it is clear that focus on the handling is very important from a safety, but also from an optimized handling point of view. In particular here the generation of dust plays an important role throughout handling. Dust generation is related to the durability of products, in other words the wear rate of particles subject to forces. During transport, storage and handling the products are undergoing different forces within different pieces of equipment. For example impact forces when particles fall down or impact geometries and compressive forces when in storage. Over the years a standard for wood pellets (EN15210) has been developed to assess the durability of materials amongst others applied to wood pellets. However, it is unlikely that this is representative for the handling in the whole supply chain because real operational conditions can greatly differ in terms of forces from tests on lab-scale. Also in industry the problem of dust and fines remains despite a standard being in place. The objective of this paper is to assess the applicability of the developed durability tests for wood pellets and torrefied pellets in relation to the handling steps in the whole supply chain. Therefore, first an overview of the durability tests will be given. Secondly, an analysis of the dominant forces acting on the particles in different equipment types used in the current supply chain will be presented. Finally conclusions will be given on the usefulness of the standardized tests, particularly in relation to certification and its applicability to predict the real wear rate when materials are being handled within the existing supply chain.

Biodiesel from wet algal biomass using hydroesterification process

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In this work, we investigate the synthesis of methyl esters (biodiesel) obtained from *Scenedesmus dimorphus* and others wet algal biomass through the hydro-esterification process (esterification process preceded by hydrolysis) as possible alternative for conventional processes. There is interest to develop new raw materials and reactions processes that favors the maintenance of biodiesel in the global energy matrix (Some countries like Brazil have mandatory biodiesel programs). In the esterification of fatty acids with methanol it was used niobium oxide as catalyst. The product was evaluated by gas chromatography and other analyses according to ASTM D6751. The optimum conditions found in the conversion (%) for the hydrolysis reactions (90, 86%), were observed in the molar ratio water:oil (20:1), at 300°C and after 1 hour, batch reactor. Esterification of algae fatty acids onniobium oxide presented enough conversion after two steps using methanol:fatty acid (3:1, molar ratio), at 200°C, during 1 hour with 20% of catalyst (wt/wt). Niobium catalyst has been used for 10 times under esterification conditions with no significant deactivation. Under this methodology, biodiesel complies the ASTM standard with some antioxidant additive.