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Short Communication

The Use of Eggshell Waste Ceramics Coating in Thermal Yield Of Aviation Engines

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Abstract

Throughout the long term, a few terms have been utilized for this Aeronautical engines are designed with mechanical characteristics that can offer automatic cooling and, because of their construction complexity, it became very expensive. Before that, the present work proposes to find means for cheapen the process of construction of engines, internally coating with ceramic, since, as several proven studies, have high coefficient of thermal resistance, being able to reach extreme temperatures. Aiming to contribute to a worldwide trend of sustainability, that appreciates the use of chemical substances, mainly as rejection results, applying existing techniques, this study submitted to ceramic development, obeying technological techniques and using eggshell (ES). This material contains - among other compounds - significant amounts of calcium oxide and molten materials such as calcium, magnesium, potassium and sodium, with a melting temperature close to 2,572 ° C. Thus, could create 36 specimens with different ES, Phyllite and Feldspar (main components present in ceramics) percentages, and perform tests and analysis, which proved the potentiality of their use. An important feature of Ceramics presence of thermal limits, which provide an incensement in mechanical resistance when heated at high temperatures. Therefore, they are an excellent thermal insulator and have a high melting point. On the other hand, we have the traditional aeronautical engines, which can reach 2000 ° C and require great concern about this factor. Therefore, a ceramic can be used for reduction of investment purposes in the engines construction sector and obtain applicable tax values, as well as in accordance with technical standards and sustainable development of the environment. . Biography: Student of the Mechanical Technician course, integrated modality, at the Federal Institute of Science and Technology Education of Bahia (IFBA) - Campus Salvador. He is part of the organizing committee of the Week of Mechanics and conducts research in the area of ceramics and materials. In addition, he taught in the Basic Notions of Preparation and Operation of the Gear Generator Renânia and Electric Welding and MIG / MAG Welding.

Keywords

Fe3O4/CaO catalyst; eggshell waste; palm oil off-grade; transesterification; biodiesel

Introduction

Due to global warming and other environmental concern today, many countries are trying to reduce carbon dioxide emissions in atmosphere by reducing the fossil fuel as the energy resources. There is one of the most effective ways to replace the fossil fuels with implementations of renewable energy [1]. Usually, different countries have different types of renewable energy available. Concerning this issue, several countries have successfully implemented some renewables from bioenergy, including biogas, biodiesel, and bioethanol. On the other sides, some countries have also successfully generated the electrical power from renewable energy resources, such as geothermal, waves, hydro, wind, and solar energy. However, there are some weak points resulted while the renewable energy is used, such as it is unstable, only available for certain periods, and therefore, its required the energy storage devices such as battery. However, the energy storage capacity of batteries is very limited, and for this reason some scientists are attempting to discover another type of energy storage materials that can store significant amount of energy

Calcium is one of the most abundant metals on earth. It can be mostly found as an ion in seawater, as well as geothermal hot springs. It can be also found as an oxide in limestone and fossilized remnant sites. However, in order to obtain the calcium from these resources is required the natural resource exploitation that is often given negative impact to environment.

Nowdays, the alkali catalysts including CaO is popular used in biodiesel synthesis through the transesterification process by using unedible oils, such as Jatropha curcas oil.However, on practical application while the CaO was used directly as a catalyst in the transesterification process, the oxygen ions in the CaO surface will form a hydrogen bond with methanol and glycerin, resulting in an increasing of the glycerin viscosity and formation of the suspension of CaO; thus, the CaO and glycerin are difficult to separate from the product. To overcome this problem, the CaO should be impregnated with any catalyst supports or other metal oxides. The utilization of solid base catalysts (CaO) which are supported by metal oxides has gained attention from other research. There are some published articles which concern the modification of CaO catalyst, including those concerning KF/CaO-Fe3O4 [24], CaO/Al/Fe3O4 [25], CaO.ZnO [23], CaO/CoFe2O4 [26], K2O/CaO-ZnO [27], MgFe2O4-CaO [28], and Fe3O4/CaO [29]. These studies were focused on the investigation of appropriate heterogeneous solid base catalysts are able to be separated from the product. Furthermore, the catalysts showed activity and good catalytic properties, and also showed the highest biodiesel yields [25]. Additionally, the utilization of a catalyst enables an increase in the biodiesel yield from commercial edible sunflower oil.

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