BIODIESEL PRODUCTION FROM WASTE COOKING OIL FROM 3 FAST FOOD RESTAURANTS IN THE METROPOLITAN AREA OF MONTERREY, NUEVO LEON, MEXICO.

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Introduction. Biodiesel is a biofuel that is mostly produced from vegetable oils from crops not taking in important consideration recycling options such as the use of waste vegetable oils, given that the use of these residues does not compete with food crops (1). The characterization and optimization of the properties of these oils is very important for efficient use in obtaining biodiesel.
The objective of this work was the standardization of conventional production method to produce biodiesel from waste cooking oils for comparison with biological transterification processes catalyzed via lipases.

Methods. Samples were collected from three different fast food restaurants (E1, E2 and E3). One liter of oil was heated up to 130° C respectively, then placed in plastic containers for storage at room temperature. Characterization by gas chromatography in order to determine the fatty acid profile and the molecular weight was performed. Parameters like molar ratio alcohol/oil, and type and concentration of catalyst, temperature and agitation time were evaluated (2).The experimental design was temperature 60 ° C, 4 molar ratios, two types of catalysts and 3 concentrations. Subsequently two washing methods were evaluated in order to remove impurities. Additionally biodiesel quality parameters obtained were determined. For the characteristics of the sample E3 additional steps had to be performed in the transterification process.

Results. Production of biodiesel was reached from the 3 different samples (Fig. 1). For sample E1 the best result was in the order of 66.37% with 90 min agitation, 60°C, 0.5% of KOH and a molar relation of 10:1. For E2 the molar ratio performance was of 85.53% with molar relation of 10:1, catalyst concentration of 1% and 90 min agitation. In the case of E3 we establish esterification of 0.16 ml/L of H_2SO_4 with 60 min agitation at 55 °C followed by a transterification with 0.5% in concentration of catalyst with a molar relation of 15:1 and 60 min agitation with a final result of 81.12%. By other hand, the washing method by agitation was selected given the minor lost in volume. The quality parameters are all within the normal limits (Table 1).

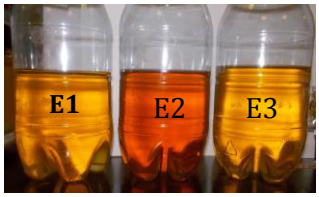

Fig.1 Purified biodiesel samples

Table 1. S= sample, P= density, CP= cloud point, PP=pour point, TAN=total acid number, FP=flash point, IG= ignition point.

S	pH	ρ	CP	PP (+3°C)	TAN	FP	IG
E1	6.5	0.873	2°C	-2°C	0.6	163°C	175°C
E2	6.0	0.867	11°C	7°C	0.6	177°C	185°C
E3	6.5	0.867	14°C	5°C	0.6	168°C	168°C

Conclusions. Starting from waste cooking oil with a wide range of acidity and molecular weight was possible to obtain biodiesel, having results up to 85.353% in final production, this is considerable because the raw material is a waste with a potential for cost reduction in the process.
By other hand, the washing method by agitation was selected given the minor lost in volume. The quality parameters are all within the normal limits.

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