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Synthesis of Biofuels of New Generation

Authors : Selena Gutiérrez, Araceli Martínez

Abstract : One of the most important challenges worldwide, scientific and technological, is to have a sustainable energy source; friendly to the environment and widely available. Currently, the 85% of the energy used comes from the fossil sources. Another important environmental problem is that several rubber products (tires, gloves, hoses, among others) are discarded practically without any treatment. In nature, the degradation of such products will take at least 500 years. In 2009, the worldwide rubber production was about 23.6 million tons. In order to solve this problems, our research focus in an alternative synthesis of biofuels in a two-step approach: The metathesis degradation of industrial rubber (models of rubber waste), and the oligomers transesterification. Thus, cis-1,4-polybutadiene (Mn= 9.1x105, Mw/Mn= 2.2) and styrene-butadiene block copolymers with 30% (Mn= 1.61x105; Mw/Mn= 1.3) and 21% wt styrene (Mn= 1.92x105; Mw/Mn= 1.4) were degraded via metathesis with soybean oil as chain transfer agent (CTA) and green solvent; using [(PCy3)2Cl2Ru=CHPh] and [(1,3-diphenyl-4,5-dihydroimidazol-2-ylidene)(PCy3)Ru=CHPh] catalysts. Afterwards, the products were transesterified by basic homogeneous catalysis. Before transesterification, the polystyrene microblocks (Mn= 16,761; Mw/Mn= 1.2) were isolated. Finally, the biofuels obtained (BO) were purified, characterized and showed similar properties to standards biodiesel (SB) (Norms: EN 14214-03 and ASTM D6751-02), i.e. (SB / BO): molecular weight [Daltons] (570 / 543-596), density [g/cm3] (0.86-0.90 / 0.88), kinematic viscosity [mm2/s] (1.90-6.0 / 3.5-4.5), iodine (97 / 97-98) and cetane number (Min.47 / 56-58).

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