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Experimental Evidence of the Effectiveness of Different Bioalcohols Applied as Biofuels

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Abstract:

The technological, environmental, and human health demands, to substitute fossil fuels, have signaled that a consistent solution for the complete replacement of current technologies, which use fossil fuels, for more ecological alternatives, does not rely on a single approach, but on several clean energy strategies, which applied together, could in fact drastically reduce the current emissions of toxic gases into the atmosphere. Much has been discussed about the replacement of cars powered by internal combustion engines by electric vehicles, but it is still not clear what will be done with the batteries used in these electric cars in the long term, without harming the environment in different countries, under different political and cultural conditions. Furthermore, the electric cars have the disadvantage associated to the time required to charge self-propelled batteries and the installed infrastructure to recharge these vehicles, which is a significant barrier for adoption of the technology. In this context, the application of biofuels is advantageous both over fossil fuels as they have a carbon neutral cycle, and over electric cars, as there is no problem with discarding batteries and charging. We present in this talk, a review of our recent experimental studies published in the literature on electron impact ionization and fragmentation of the alcohols methanol, ethanol, 1-propanol,1-butanol and 2-butanol. We discuss the mass spectra (MS) of these alcohols, measured for the electron impact energy of 70 eV and also, total (TICS) and partial (PICS) ionization cross sections in the energy range from 10-100 eV, which revealed the probability of forming different cations, by either direct or dissociative ionization. These experimental TICS are summarized together with theoretical values, calculated using the Binaryencounter Bethe (BEB) and the independent atom model with the screening corrected additivity rule (IAM-SCAR) methods. Additionally, we compared data of appearance energies - AE and discussed the application of the extended Wannier theory to PICS in order to produce the ionization and ionic fragmentation thresholds for the electron impact of these alcohols. These studies report that although ethanol is currently the most widely used biofuel, isomers of butanol may have some advantages over it, and provides essential data for the complete assessment of these

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molecules as a biofuel.

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