P46-IT

STUDY OF CYCLOPENTANE USING A RAPID COMPRESSION MACHINE AT LOW-TEMPERTURE IGNITION

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Gasoline and diesel fuels comprise many different types of components including *n*-alkanes, branched alkane, cycloalkanes, olefins and aromatic species. Cycloalkanes can compose up to 35% of conventional diesel fuels, yet there is very little data in the literature on the study of the oxidation of this particular component type. Previous kinetic measurements for cyclopentane have been made in a jet-stirred reactor and in shock tubes[1]. The simulation of combustion of diesel is not possible because it contains hundreds of individual hydrocarbon compounds, thus surrogate models are developed where one component is used to represent different classes of fuel components, e.g. *n*-heptane to represent *n*-alkanes and toluene to represent aromatic content. It is postulated that cyclopentane may be a good fuel to represent the cycloalkane component of conventional fuels.

Thus, we have measured ignition delay times for the oxidation of cyclopentane in both a rapid compression machine (RCM) and in a shock tube, which are techniques applicable to the characterization of products (biofuels) obtained by nanotechnology techniques such as immobilized enzymes. These machines provide fundamental data for the validation of a detailed chemical kinetic mechanism.

Cyclopentane/air (79% N_2) mixtures were studied in an RCM at temperatures from 600–900 K, at pressures of 20 and 40 atm, and at equivalence ratios of 0.5, 1 and 2 (Fig. 1). Because the time-scale of a rapid compression machine experiment is so long, heat losses are significant. Thus, a series of nonreactive experiments were performed in order to account for the heat loss associated with each mixture composition and pressure.

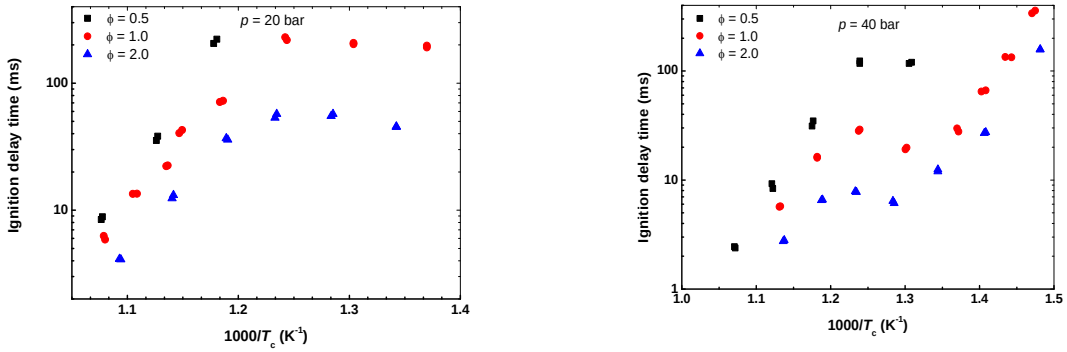

Figure 1.Cyclopentane ignition in RCM, (left) P=20, (right) P=40; ■Φ=0.5, ●Φ=1, ▲Φ=2.

Acknowledgment
Grants from the Spanish Ministry of Economy and Competitiveness (Project ENE 2011-27017), ceiA3 funding, the research leading to these results has received funding from the People Programme (Marie Curie Actions) of the European Union's Seventh Framework Programme FP7/2007-2013/ under REA grant agreement n° 607214, are acknowledged by the authors.

[1]Daley, S. M.; Berkowitz, A. M.; Oehlschlaeger, M. A. *Int J Chem. Kinet*, **2008**, 40, 624.