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High Energy Electron Beam Irradiation of Hydrocarbons with Different Saturation Degree KUNPENG WANG, DAVID STAACK, Texas AM University — Saturation degree of hydrocarbons indicates the hydrogen deficiency of a hydrocarbon inside its molecule and have been widely used in chemistry field. It affects the physicochemical properties of a molecule such as its molecular geometry, average chemical bond strength as well as electron density distribution. Effect of saturation degree (SatuDe) of a hydrocarbon molecule on its stability under high energy electron beam irradiation was studied. A high energy electron beam (10 MeV, LINAC) was used to irradiate hydrocarbons samples in a batch reactor submerged in a water bath in a temperature range of 5-20 ^{o}C. Hydrocarbon samples were selected to represent saturated alkanes, alkanes with ring structure, aromatics, aromatics with branch of different length and polyaromatics. For example, SatuDe values for saturated alkanes (group 1) is equal to 1. Group 2 which includes alkenes and saturated alkanes with ring structures has a SatuDe values between 0.7-0.9. Group 3 are represented by benzene and toluene which are aromatics hydrocarbons. SatuDe values for them are in the range of 0.3-0.5. During experiments, specific energy input (SEI) to all samples was controlled by controlling the irradiation time. SEI was in the range of 350-450 kJ/kg. Analysis by GC-FID and TGA showed that original compounds in each sample were converted to new compounds which depends on the saturation degree of the sample. High satuDe gave high total conversion and favor conversion to light compounds. Low satuDe samples showed low conversion and favor conversion to heavy compounds such as polymerized species.

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