

On the kinetics of advanced tar elimination both in-bed and downstream from a fluidized bed biomass gasifier

Maria P. Aznar^a, José Corella^{*b}, José M. Toledo^b

^aDept. Chem. And Environm. Eng. (CPS); Univ. of Saragossa, 50015 Saragossa
Fax: +34-976-76 21 42

^bDept. Chem. Eng.; Univ. Complutense, 28040 Madrid, Spain.

Tar abatement in biomass gasification is a well known problem. These authors believe that it has to be carried out both in the same gasifier and, very often needed too, downstream from the gasifier. For such tar elimination there are well known methods such the use of in-bed dolomite, secondary air flows, catalytic beds of nickel based catalysts (monoliths or rings) or of (calcined) dolomites, etc... Corella and co-workers, for instance, have already published several kinetic studies for this tar abatement. Most of such studies were based on a single and easy overall chemical reaction with only one lump for tar, and a first order kinetic equation. Only in the last World Conference on Biomass held in Sevilla past June 2000, a 6-lumps model for catalytic tar abatement was there presented.

This communication presents more recent developments on the above said matter using the 6-lumps model for the tar. Such model is now presented and used not only for the downstream catalytic bed but also for the same gasifier. These new kinetic equations for the in-bed tar elimination are very useful (and needed indeed) for modeling all fluidized bed biomass gasifiers in which the reactions involving generation and (thermal and catalytic) destructions of tars have to be taken into account.

New data on kinetics of this 6-lumps tar elimination network together with several examples of calculations are presented in this communication. Finally, another kinetic model based on considering the tar as a continuous mixture is here presented. This new model predicts the evolution of the molecular weight distribution (of the tar) when it is catalytic eliminated (reacted, destroyed).

For the few people working on catalytic gas cleaning (in biomass gasification) this work might be useful, it is a small step forward in this area.