

CHEMICAL ENGINEERING

DISAT - Kinetic analysis and reactor modeling of aqueous phase reforming from the production of renewable hydrogen

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Context of the research activity	The modeling of the reaction of aqueous phase reforming will be addressed both from the catalytic point of view and from the reactor point of view. Hence, the system is triphasic (liquid, gas, solid-catalyst) and needs to be tackled in its complexity to properly interpret the experimental results and design suitable reactors for this reaction.
Objectives	The topic of aqueous phase reforming is very relevant nowadays because it represents a technology for the production of renewable hydrogen from waste waters. Many aspects are under investigations, such as the complex kinetics of this reaction, given the multitude of chemical species in the system and the in-series or in-parallel pathways that may lead to hydrogen, alkanes or byproducts. The object of the PhD is to study such kinetics, supported by a robust availability of experimental data, as well as the transport phenomena in the reactor, made of fixed bed of catalyst in which hydrogen gas bubbles nucleate from the liquid phase. Since hydrogen also reacts with the products of APR, its fast removal is crucial not to consume it in parasite reactions.
Skills and competencies for the development of the activity	The candidate should possess both experimental and modeling attitude. On the one hand, experiments will be carried out to retrieve the physical and chemical parameters of the the system. On the other hand, a multiscale approach will be employed to properly address the modeling of the system.