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Syngas cleaning and characterization

The production of synthesis gas (syngas) from biomass and biowaste is currently considered as an attractive renewable feedstock and promising route to produce chemicals, hydrogen, biofuels, and electricity by both the industrial and scientific communities. This trend is likely to continue in the foreseeable future due to the ever-increasing pressures from emissions regulations and end-user device quality requirements. Syngas is a mixture of hydrogen (H_2) and carbon monoxide (CO) produced from the gasification or reforming of various carbonaceous feedstock. Raw syngas contains contaminants that must be characterized and mitigated to meet process requirements and pollution control regulations. Depending on the physical and chemical characteristics of the feedstock different technological pathways can be applied to produce syngas. The typical components of raw syngas can be classified into three groups: non-condensable gases (e.g. H_2 , CO, CH_4 , and CO_2), condensable gases (e.g. H_2O and tars) and impurities (e.g. HCl, NH_3 , H_2S and particulates). Depending on the application, raw syngas may need to be cleaned of impurities and conditioned to adjust the H_2/CO ratio in order to meet the requirements of environmental regulations and downstream processes respectively. Hence, an accurate characterization of the syngas chemical composition, at the different processing stages, is important to control and optimize the process efficiency. In this paper, various methods and equipment for sampling, preconditioning and analyzing the syngas components will be discussed. Analyses of the equipment detection limits, gas matrix sensitivity, and overall accuracy will also be made. Some applications of syngas will be also discussed.

Biography

Ange Nzihou is Distinguished Professor of Chemical Engineering. He is Director RAPSODEE Research Centre-CNRS. He is Editor-in-Chief of a Springer Journal "Waste and Biomass Valorization" and chair of the Waste Eng. Conference series. His research is focused on Thermochemical Conversion of Biomass and Waste to Energy and Added Value Materials. A second field is the characterization, mechanisms, elaboration, functionalization of composites for energy and depollution. He has published more than 120 papers in peer-reviewed journal, has delivered more than 30 plenary and keynote lectures in international conferences over the 10 past years. He is Guest Professor in number leading universities in USA, China, India, and Europe.

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