

## UV-Vis Spectroscopy as a Tool for Online Tar Measurements in Wood Gasification Processes

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**Abstract :** The formation and control of tars remain one of the major challenges in the implementation of biomass gasification technologies. Robust, on-line analytical methods are needed to investigate the fate of tar compounds when different measures for their reduction are applied. This work establishes an on-line UV-Vis method, based on a liquid quench sampling system, to monitor tar compounds in biomass gasification processes. Recorded spectra from the liquid phase were analyzed for their tar composition by means of a classical least squares (CLS) and partial least squares (PLS) approach. This allowed for the detection of UV-Vis active tar compounds with detection limits in the low part per million by volume (ppmV) region. The developed method was then applied to two case studies. The first involved a lab-scale reactor, intended to investigate the decomposition of a limited number of tar compounds across a catalyst. The second study involved a gas scrubber as part of a pilot scale wood gasification plant. Tar compound quantification results showed good agreement with off-line based reference methods (GC-FID) when the complexity of tar composition was limited. The two case studies show that the developed method can provide rapid, qualitative information on the tar composition for the purpose of process monitoring. In cases with a limited number of tar species, quantitative information about the individual tar compound concentrations provides an additional benefit of the analytical method.

**Keywords :** biomass gasification, on-line, tar, UV-Vis

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