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Energy extraction from wine dregs by self-sustained burning with fluidized-bed combustor

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Abstract

The disposal of such high-moisture (up to 70%-80%) waste (wine dregs) troubles the brewery in Taiwan. The fluidized medium (sand in general) possesses the strong ability of heat reservation that makes the high-moisture waste pre-drying. In addition, the utilization of absorbed-limestone can get rid of generated SO_x. It is very suitable to direct combustion of wine dregs due to its collective characteristics of pre-drying, combustion and elimination of pollutant. This paper was devoted to study the feasibility for self-sustained combustion of high-moisture Chinese Kaoliang-wine lees by Bubble-Type Fluidized-bed combustor. The results reveal that the moderate operational temperature is about 860°C with about 230mm-H₂O pressure drop and 92.3% combustion efficiency for self-sustained combustion of wine lees. That is, the moisture content must be controlled below 70%. The emission of SO_x (about 23ppm), NO_x (about 67ppm) and particulates can be neglected. The emission of CO was a vital problem, but can be suppressed to 92ppm by modulating some factors that are operational temperature, axial temperature distribution, primary air & excess air. The couple effects of these factors are studied in this paper.

Key words: Energy extraction; Fluidize-bed combustor; Wine dregs