

GAS-STEAM EFFICIENT COGENERATION PROCESS AND SYSTEM BASED ON BIOMASS GASIFICATION AND METHANATION

ABSTRACT

The present invention provides a gas-steam efficient cogeneration process and system based on biomass gasification and methanation, comprising a biomass gasification unit, a transformation unit, a purification unit, a methanation unit, and a methane concentration unit. The gasification unit utilizes a locally-external constant high-temperature heat source airflow bed which can remarkably improve effective gas compositions of CO and H₂ and improve biomass gasification efficiency. The gasification unit can greatly reduce the quantity of tar produced at a high temperature, improves the carbon conversion rate, and removes investment on a tar removing device. In the process of methanation, the conversion efficiency of CO reaches 100%, and the conversion efficiency of H₂ reaches 99%. Also, a large amount of by-product intermediate pressure superheated steam is produced, and power consumption of a circulation compressor in the traditional methanation reaction is reduced. The present invention has the advantages that biomass energy can be converted into clean, high-calorific-value, and convenient-for-use natural gas, and a large amount of heat released in the biomass gasification and methanation reaction can be efficiently recycled through a mode of producing high-quality superheated steam.

Fig. 1