DEVELOPMENT OF A PILOT PASSIVE SOLAR DISTILLATION PLANT FOR *DAN-JIRIMA* COMMUNITY HEALTH POST, KANO-NIGERIA

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Many rural communities in Nigeria including the *Dan-Jirima* community in Kumbotso LGA of Kano state, lack access to clean portable water and mostly depend on sources that are largely unhygienic, including flowing or stagnant bodies of water and wells. Some of these rural communities host primary health posts whose operations are often impeded by a lack of clean water for sterilization and other clinical uses as well as for consumption by both staff and patients. One most promising way to address the problem of lack of access to clean water for these health posts is the establishment of water distillers, using solar energy as the renewable energy source. A solar still plant was designed and constructed to meet the water requirements of a rural health post in Kano, Nigeria. The plant, consisting of four identical units, each incorporated with a porous cloth wick material and blackened gravel for thermal storage, was test-run using river and well water as sources of unpurified water at basin depths of 20 mm, 30 mm and 40 mm. The total daily distillate yield were 7.40 liters/m^2/day, 6.75 liters/m^2/day, and 5.71 liters/m^2/day for respective depths of basin water for the river water, while for the well water, the corresponding values were 6.96 liters/m^2/day, 6.17 liters/m^2/day, and 5.62 liters/m^2/day. The mean efficiencies were 32.1% when river water was used and 25.8% when well water was used, thus bringing the overall efficiency of the plant to 28.9%. Further, it was noted that significant distillate production above 1 liter/hour began at 11:30 hour, at basin water temperatures above 55 ºC and at an average solar radiation of 850 W/m^2 for the river water and 890 W/m^2 for the well water. Lastly, the continued accumulation of distillate above 1 liter/hour at the mean basin water temperature of 55ºC even after peak period hour and even with declining solar radiation was attributable to the use of storage media in the still, which gives out the needed heat when the solar radiation declined. It is recommended that a thorough economic analysis of the still plant be undertaken in order to further reveal the attractiveness

of the project for further improvement and implementation by stakeholders, as well as a bacteriological and mineralogical test of the distillate, so as to enable steps to be taken to restore, if necessary, vital minerals, that may have been lost in the course of distillation.

Keywords: Distillate; Transmissivity; Latent heat; Thermal storage; Solar radiation.

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