ABSTRAK

Air bersih merupakan kebutuhan pokok manusia untuk memenuhi kebutuhan sehari-hari. Saat sekarang ini, kualitas air semakin menurun akibat banyaknya zat-zat pencemar atau bahan lain yang masuk ke lingkungan sekitar. Kesulitan untuk memenuhi kebutuhan air bersih pada saat musim kemarau masih dirasakan oleh beberapa industri penghasil bersih di Indonesia. Distilasi energi surya adalah salah satu cara untuk memperoleh air bersih dari air kontaminasi dengan energi surya. Alat distilasi energi surya jenis *absorber* kain memiliki permasalahan terkait efisiensi dan hasil air bersih yang dihasilkan. Penelitian ini bertujuan menganalisis kenaikan temperatur air dan kinerja distilasi energi surya siklus aliran tertutup dengan memanfaatkan panas hasil air buangan kembali. Penelitian ini menggunakan metode eksperimental dengan pemanfaatan panas hasil air buangan dilakukan dengan menggunakan tangki yang telah dimodifikasi. Penelitian ini dilakukan di lapangan terbuka selama 7 jam pengujian. Sekat terbuat dari alumunium berbentuk siku dengan jarak 4,6 cm setiap batangnya dan disusun secara merata di atas permukaan *absorber*. Alat distilasi energi surya jenis *absorber* kain model konvensional sebagai alat distilasi energi surya siklus aliran terbuka pada penelitian ini. Laju aliran air masukkan divariasikan sebesar 3,6 liter/jam, 4,8 liter/jam, dan 7,7 liter/jam untuk distilasi dengan siklus aliran terbuka, sedangkan laju aliran air masukkan divariasikan sebesar 1,5 liter/jam, 2 liter/jam, dan 2,5 liter/jam untuk distilasi dengan siklus aliran tertutup. Hasil analisis menunjukkan peningkatan temperatur *absorber* berbanding lurus dengan peningkatan kinerja alat distilasi energi surya dengan siklus aliran tertutup. Hasil penelitian menunjukkan temperatur air masukkan meningkat dengan memanfaatkan panas hasil air pembuangan meningkatkan 16% hingga 65% temperatur di *absorber*. Produktivitas hasil air bersih siklus aliran tertutup meningkat 3 hingga 10 kali lebih banyak dan efisiensi siklus aliran tertutup meningkat 36% lebih tinggi dibandingkan siklus aliran terbuka. Produktivitas air bersih dan efisiesi tertinggi siklus aliran tertutup masing-masing sebesar 1,372 liter/m^2.hari dan 43% diperoleh dengan variasi laju aliran 2 liter/jam.

Kata kunci : distilasi, siklus aliran tertutup, kinerja, hasil air buangan

ABSTRACT

Clean water is a basic human need to meet daily needs. Currently, water quality is decreasing due to a large number of pollutants or other substances that enter the surrounding environment. The difficulty in meeting the need for clean water during the dry season is still felt by several clean producing industries in Indonesia. Solar energy distillation is one way to obtain clean water from contaminated water with solar energy. The cloth absorber type solar energy distillation device has problems related to efficiency and the yield of clean water produced. This study aims to analyze the increase in water temperature and the distillation performance of closed-flow solar energy by utilizing the heat from the wastewater again. This study used an experimental method with the utilization of heat from wastewater. This research was carried out using a modified tank. This research was conducted in an open field for 7 hours of testing. The bulkhead is made of aluminum in the shape of an elbow with a distance of 4.6 cm per stem and is arranged evenly on the surface of the absorber. The conventional cloth absorber type solar energy distillation apparatus as an open-flow cycle solar energy distillation apparatus in this study. The input water flow rate was varied by 3.6 liters/hour, 4.8 liters/hour, and 7.7 liters/hour for distillation with an open flow cycle, while the input water flow rate was varied by 1.5 liters/hour, 2 liters/hour, and 2.5 liters/hour for distillation with a closed flow cycle. The results of the analysis show that the increase in absorber temperature is directly proportional to the increase in the performance of the solar energy distillation with a closed flow cycle. The results showed that the temperature of the input water increased by utilizing the heat from the exhaust water, increasing the temperature in the absorber by 16% to 65%. The yield productivity of closed flow cycle clean water increases 3 to 10 times more and the efficiency of a closed flow cycle increases 36% higher than the open flow cycle. Clean water productivity and the highest efficiency of closed flow cycles, respectively 1.372 liters / m2.day and 43%, were obtained by varying the flow rate of 2 liters/hour.

Keyword : *solar still, closed-flow solar still, performance, waste water*