

MODIFIKASI DAN UJI PERFORMANSI ALAT DESTILASI AIR LAUT MENGUNAKAN TENAGA SURYA

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ABSTRAK

Destilasi surya merupakan salah satu cara untuk mengolah air laut menjadi air tawar. Air laut dipanaskan sehingga terjadi penguapan, kemudian uap didinginkan dan menghasilkan air tawar. Tujuan dari penelitian ini untuk mengetahui dan menguji kinerja alat destilasi air laut dengan memanfaatkan tenaga surya dalam menghasilkan garam dan air tawar, serta kesetimbangan massa air laut sehingga tingkat efisiensi dari alat destilasi ini lebih meningkat dari sebelumnya. Alat yang digunakan terdiri dari satu set alat destilator, bak penampung air, gelas ukur, termokopel (Termokopel HT-9815), Termometer Digital (Termometer Digital HTC-2 Clock), stopwatch, pH meter (pH Meter 009i), dan TDS meter (HM AP-1), Refraktometer (Portable Refractometer) sedangkan bahan yang digunakan adalah air laut 10 liter. Metode yang digunakan dalam penelitian ini adalah eksperimental dengan melakukan uji kinerja alat Destilator di halaman parkir belakang tepatnya di depan Laboratorium Daya dan Mesin Pertanian. Uji kinerja dilakukan dengan menggunakan volume bahan 10 liter selama 13 hari. Pengambilan data setiap hari selama 10 jam dimulai pukul 08.00-17.00 WITA dengan mencatat perubahan temperatur suhu setiap satu jam. Parameter yang diamati pada penelitian ini yaitu, suhu, intensitas cahaya matahari, kualitas fisik air hasil destilasi (pH, Suhu air, TDS dan kadar garam), volume garam dihasilkan, kesetimbangan energi, dan efisiensi alat destilasi. Hasil penelitian menunjukkan bahwa semakin tinggi intensitas cahaya yang diterima oleh alat destilasi, semakin tinggi suhu penguapan air laut, sehingga semakin banyak air tawar yang dihasilkan. Jumlah energi yang masuk paling tinggi, yaitu sebesar 3.065.763 Joule dan yang terendah sebesar 1.254.843 Joule. Sedangkan energi yang terpakai paling tinggi, yaitu sebesar 1.994,240 Joule dan yang terendah sebesar 1.095.514 Joule. Energi yang hilang dari plat penyerap paling tinggi, yaitu sebesar 2.866.339 Joule dan yang terendah sebesar 159.329 Joule, sehingga menghasilkan efisiensi yang tertinggi dan terendah sebesar 87% dan 51%.

Kata kunci: air bersih, alat destilasi, efisiensi

MODIFICATION AND PERFORMANCE TEST OF SEA WATER DISTILLATION DEVICES USING SOLAR ENERGY

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ABSTRACT

Solar distillation is one way to process sea water into fresh water. Sea water is heated so that evaporation occurs, then steam is cooled and produces fresh water. The purpose of this study was to determine and test the performance of sea water distillation equipment by utilizing solar power in producing salt and fresh water, as well as sea water mass balance so that the level of efficiency of the distillation equipment this is more increased than before. The equipment used consists of a set of distillation unit, water storage tanks, measuring cups, thermocouples (Thermocouple HT-9815), Digital Thermometers (Digital Thermometers HTC-2 Clock), Stopwatch, pH meters (pH Meter 009i), and TDS meters (HM AP-1), Refractometer (Portable Refractometer) while the material used was 10 liters of sea water. The method used in this research was experimental by conducting the performance test of the distillation unit on the rear parking lot precisely in front of the Power and Agricultural Machinery Laboratory. The performance test was carried out using 10 liter material volume for 13 days. Retrieval of data every day for 10 hours starting at 8:00 to 17:00 WITA by recording temperature changes every hour. The parameters observed in this study were temperature, intensity of sunlight, physical quality of distilled water (pH, water temperature, TDS and salinity), volume of salt produced, energy balance, and efficiency of distillation equipment. The results showed that the higher the light intensity received by the distillation device, the higher the evaporation temperature of sea water so that more fresh water was produced. The highest amount of incoming energy was 3,065,763 Joules and the lowest was 1,254,843 Joules. While the highest energy used was 1,994,240 Joules and the lowest was 1,095,514 Joules. The highest energy loss from the absorbent plate was 2,866,339 Joules and the lowest was 159,329 Joules. Resulting in the highest and lowest efficiency at 87% and 51%.

Keywords: clean water, distillation unit, efficiency