

Studi eksperimental pada chiller adsorpsi silica gel/air tipe rectangular finned-tube, modular adsorbers = Experimental study on silica gel water adsorption chiller with rectangular finned tube type modular adsorbers / Aris Manga

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Abstrak

ABSTRAK

Teknik refrigjerasi dengan penyerapan, yang menggunakan energi kalor yang rendah dan mampu menghasilkan pengkondisian udara serta efek refrigjerasi, mendapatkan perhatian besar sebagai bagian dari teknologi konversi energi. Teknologi refrigjerasi dengan penyerapan mencakup teknologi absorpsi dan teknologi adsorpsi. Naskah ini mempresentasikan desain terbaru chiller adsorpsi silica gel/air yang dikembangkan di Departemen Teknik Mesin, Universitas Indonesia. Konfigurasi chiller terdiri dari dua ruang penyerapan, dengan menggunakan rectangular finned-tube heat exchanger sebagai adsorber, kondenser and evaporator. Chiller diuji pada kondisi temperatur hot water inlet/cooling water inlet sebesar 65/30 C. Heat dan mass recovery diadopsi dalam eksperimen untuk meningkatkan kapasitas pendinginan masing-masing dengan waktu 40 dan 20 detik. Waktu siklus pendinginan pada 800,700,600 dan 500 detik untuk menghasilkan waktu optimal yang berkaitan dengan performa. Nilai rata-rata COP, SCP dan kapasitas pendinginan dihitung untuk mendapatkan performa chiller secara keseluruhan masing-masing 0,6 kW; 0,7 kW/kg dan 3 kW. Kata kunci: chiller adsorpsi; heat recovery; mass recovery; performa; penyerapan; silica gel/air

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ABSTRACT

Sorption refrigeration, which is driven by the lowgrade heat and provides the air conditioning and refrigeration effect, is paid more and more attention as one of the energy conversion technologies. Sorption technology includes absorption and adsorption technology. This paper presented a new design of silica gel water adsorption chiller which is developed in Mechanical Engineering Department, University of Indonesia. The chiller design configuration is composed of two sorption chamber, with compact rectangular finned tube heat exchanger as adsorber, condenser and evaporator. The chiller is tested under typical condition for hot water inlet cooling water inlet 65 30 C, respectively. Heat and mass recovery were adopted in experiment to increase the cooling capacity time are 40 and 20 s, respectively. The cooling time were 800,700,600 and 500 s to obtain the optimum cooling time related to the performance. Average value of COP, SCP and cooling power were calculated to obtain overall performance of the chiller are 0.6 kW 0.7 kW kg and 3 kW, respectively. Keywords adsorption chiller heat recovery mass recovery performance silica gel water sorption