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## Case Studies in Thermal Engineering

Volume 7, March 2016, Pages 36-46

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### Experimental study on solar-powered adsorption refrigeration cycle with activated alumina and activated carbon as adsorbent

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<https://doi.org/10.1016/j.csite.2016.01.006>

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#### Abstract

Typical adsorbent applied in solar-powered adsorption refrigeration cycle is activated carbon. It is known that activated alumina shows a higher adsorption capacity when it is tested in the laboratory using a constant radiation heat flux. In this study, solar-powered adsorption refrigeration cycle with generator filled by different adsorbents has been tested by exposing to solar radiation in Medan city of Indonesia. The generator is heated using a flat-plate type solar collector with a dimension of 0.5 m—0.5 m. Four cases experiments of solar-powered adsorption cycle were carried out, they are with generator filled by 100% activated alumina (named as 100AA), by a mixed of 75% activated alumina and 25% activated carbon (75AA), by a mixed of 25% activated alumina and 75% activated carbon (25AA), and filled by 100% activated carbon. Each case was tested for

three days. The temperature and pressure history and the performance have been presented and analyzed. The results show that the average COP of 100AA, 75AA, 25AA, and 100AC is 0.054, 0.056, 0.06, and 0.074, respectively. The main conclusion can be drawn is that for Indonesian condition and flat-plate type solar collector the pair of activated carbon and methanol is the better than activated alumina.



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## Keywords

Solar energy; Adsorption cycle; Activated alumina; Activated carbon

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Experimental study on solar-powered adsorption refrigeration cycle

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