

WASTE HEAT OR SOLAR THERMAL ENERGY ACTIVATED SORPTION SYSTEMS IN JAPAN

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ABSTRACT

As there is increasing concern about a future energy crisis and deleterious environmental impacts such as global warming and Ozone layer depletion in the Earth's atmosphere it is required to develop energy efficient technologies. From this viewpoint solar energy and/or waste heat utilization has become a crucial issue. Sorption heat pumps are considered one of the most suitable candidates for solar or thermal waste heat utilization.

A considerable number of studies have been conducted on thermally activated sorption systems with [1-2] are being representative examples. This paper presents the reduction techniques of driving heat temperature level in adsorption cycle by introducing multi-stage schemes [3]. A high efficiency absorption chiller-heater [4], multi stage (two-stage and three-stage) adsorption cycles [5] are introduced as future systems which are followed by a brief presentation of a double-stage desiccant dehumidification cycle [6] that can operate effectively with very high humid climates.

The double-stage absorption chiller-heater can provide cooling COP as high as 1.42. However, the target COP is 1.35. The chiller is ready to enter commercial market in Japan. The main advantage of the multi-stage adsorption systems is their ability to utilize low-temperature solar/waste heat between (40 ~ 95°C) as the driving heat source in combination with a coolant at 30°C. In a moderate ambient humidity condition, the two-stage dehumidification system can operate effectively with driving source temperature between 50 and 60°C.

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