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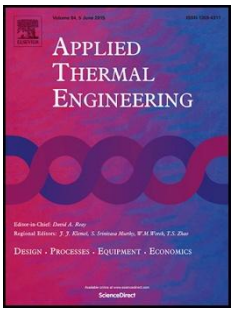

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Performance Analysis of Ultralow Grade Waste Heat Upgrade Using Absorption Heat Transformer

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Highlights

- Upgrade ultralow grade waste heat at 40~60 °C using absorption heat transformers;
- The recirculation flow ratio was found to be the most direct and crucial factor;
- The single stage transformer had medium temperature lift with a medium efficiency;
- The double stage transformer can achieve almost doubled temperature lift;
- The double effect transformer was not suitable for ultralow grade waste heat.

Abstract

The present paper aimed at exploring absorption heat transformer (AHT) to upgrade ultralow grade waste heat in the temperature range of 40 °C to 60 °C. The performance of AHTs with different configurations, including single stage, double stage and double effect systems, were numerically analyzed and compared in terms of temperature lift, coefficient of performance (*COP*) and exergy coefficient of performance (*COPe*). The most influential and crucial factor for the studied AHTs is the recirculation flow ratio (*FR*), the increase of which results in an increasing temperature lift but gradually declining *COP*. The *COPe* can achieve its maximum value with a certain *FR*, and such a state can be considered as the optimal working condition. Within the studied waste heat temperature range, the optimal *FR* in single stage AHT is in the range of 10-12, at which the system can deliver 17.1~34.7 °C temperature lift with *COP* at 0.471~0.475. The best configuration amid the studied four different double stage AHTs has a temperature lifting capacity of 31.8~68.6 °C with a *COP* around 0.30. The double effect AHT compromises its temperature lifting capacity for the highest *COP* among all the AHTs studied, which can reach about 0.65 though necessitates relatively higher waste heat

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