

## Improvement of an Absorption Heat Transformer Performance for Upgrading Low Temperature Heat by Coupling with a Vapor Compression Heat Pump

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### ABSTRACT

*This paper presents a concept of a single-stage H<sub>2</sub>O-LiBr absorption heat transformer (AHT) when it is coupled with a vapor compression heat pump (VCHP) for upgrading low temperature heat. Heat rejected at the AHT condenser is recovered by the VCHP and transferred to the AHT evaporator. For the VCHP, different types of working fluid have been considered and R-123 has been selected due to its appropriate pressure and temperature with high COP for supplying heat at around 80-90 °C.*

*A set of simulations has been carried out for the H<sub>2</sub>O-LiBr AHT coupled with the R-123 VCHP to upgrade heat from hot water stream at various temperatures. With this technique, the supplied heat could be taken at the AHT generator only, not at the evaporator and the generator as the normal AHT. It could be seen that the overall COP of the combined cycle would be around 0.8, compared with 0.5 of the normal AHT. For the VCHP cycle, when it is coupled with the AHT cycle, the COP is also higher than that of a common one in upgrading the low temperature heat. For the combined cycle, lower the condensing temperature ( $T_C$ ) gives a wider range of supplied hot water temperature at the generator. Higher the evaporating temperature ( $T_E$ ) results in higher the absorber temperature and the overall COP.*

**Key words:** Absorption heat transformer, Vapor compression heat pump, Simulation