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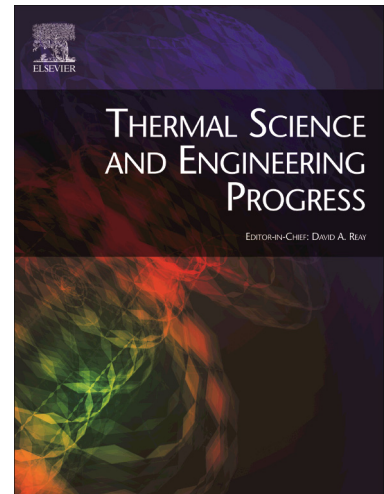
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Performance of double effect H₂O–LiCl absorption refrigeration systems and comparison with H₂O–LiBr systems, Part 1: Energy Analysis

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Abstract:

In this study, the series, parallel and reverse parallel configurations of double effect H₂O–LiCl vapour absorption refrigeration system (VARS) are thermodynamically modeled to provide performance comparison among the three systems under identical operating conditions. Parametric analysis is performed to investigate the effect of component temperatures and distribution ratio on coefficient of performance (COP) of the double effect VARS configurations. Results show that the maximum solution concentration, which is limited to 0.5 in H₂O–LiCl VARS, is mainly controlled by the system operating temperatures. In case of the parallel and reverse parallel systems, maximum solution concentration also depends upon the distribution ratio. It was found that there exists an optimal combination of HPG and low pressure generator (LPG) temperature at which the COP of a particular double effect H₂O–LiCl system is maximized. This optimal combination however varies with temperatures in the other components (absorber, condenser and evaporator). A performance comparison between double effect H₂O–LiCl and H₂O–LiBr systems under identical conditions showed better performance in case of the double effect H₂O–LiCl VARS configurations. Due to its low maximum concentration limit (0.5 against 0.65 of H₂O–LiBr VARS), double effect H₂O–LiCl VARS configurations would be more appropriate and efficient compared to the H₂O–LiBr systems, particularly at low LPG and HPG temperature applications.

Key words: Vapour absorption refrigeration system; Double Effect; series; parallel; reverse parallel; H₂O–LiCl

Nomenclature

COP	Coefficient of performance
C_p	Specific heat (J mol ⁻¹ K ⁻¹ or kJ kg ⁻¹ K ⁻¹)
h	Enthalpy (J mol ⁻¹ or kJ kg ⁻¹)

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