

Design and Optimization of Heat Pump in Wastewater Treatment Process using the Inverter Compressor by PID Controller

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The process of reducing the volume of wastewater in the wastewater treatment process plays a major role in reducing the cost of wastewater treatment. There are distillation process or heat pump process in this process and their role is to remove the water from the wastewater to concentrate the wastewater. The heat pump has a great advantage in terms of energy compared to the distillation process in that it only requires energy to compress the refrigerant. However, since the conventional pump has a fixed compressor performance, it is difficult to accurately and efficiently transfer energy when the type or condition of the wastewater is changed.

In this study, the target is to improve energy efficiency through compressor control with inverter. R407C (R32 / R125 / R143a = 23/25/52 wt%) was used as the refrigerant. Using the Aspen HYSYS, the refrigerant behavior and the heat exchange rate were analyzed by changing the rpm of the compressor. This study investigated the possibility of a heat pump that automatically controls the performance of the compressor depending on the conditions of the wastewater.