A small absorption air conditioning system

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Abstract

Lithium bromide absorption chiller uses thermal energy as its power source, and has wide energy utilization. It can save a lot of energy by using new energy to drive lithium bromide unit. At present, the minimum refrigerating capacity of commercial absorption chiller is 23KW, which is mostly used in office and public institutions. The miniaturization and high efficiency of lithium bromide chiller driven by new energy are the problems to be solved in the absorption refrigeration system. On the basis of these problems, combined with the research status at home and abroad, this paper presents a small absorption air conditioning system by multi energy driven.

Keywords

New energy, Miniaturization, Absorption, Ejector.

1. Introduction

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At present, the ratio of electricity consumption to total electricity consumption for air conditioning is increasing every year. The power consumption of household air conditioners is about 50%[1] of household electricity consumption internationally. All of this fully demonstrates that the transformation of low temperature refrigeration technology from traditional energy to new environment-friendly energy is imperative. The lithium bromide absorption chiller is driven by the heat energy, and the power consumption is obviously saved than the traditional electric power compressor. The energy consumption is reduced by the organic coupling of the new energy and lithium bromide set, especially the solar energy is used as the driving energy, so this type of model is more practical.

The low temperature of the solar energy source will affect the efficiency of the lithium bromide absorption refrigeration cycle. Feng Yi et al. [2] proposed an improved solar lithium bromide booster absorption refrigeration cycle. Wu Jiafeng and others [3] put forward the improvement plan for installing the isolation valve before condenser in the pressurization auxiliary unit circulation process.

2. SYSEM COMPOSITION

As shown in Fig.1, the refrigeration system can be divided into heat source circulation circuit, lithium bromide solution circulation circuit, cooling water circulation loop, refrigerant circulation loop and cold air circulation loop. At the time of work: The heat source cycle return route generator, heat storage water tank, solar collector, hot water pump and so on. The cold air circulation circuit is composed of an evaporator and a fan. The cooling water cycle is composed of an absorber, a condenser, a cooling tower and a cooling water pump. The lithium bromide aqueous solution circulated back to the route generator, the absorber, the solution heat exchanger, the generating pump, the absorption pump and so on. The refrigerant cycle is composed of a routing generator, a condenser, a throttle valve, an evaporator, an absorber and a solution heat exchanger.

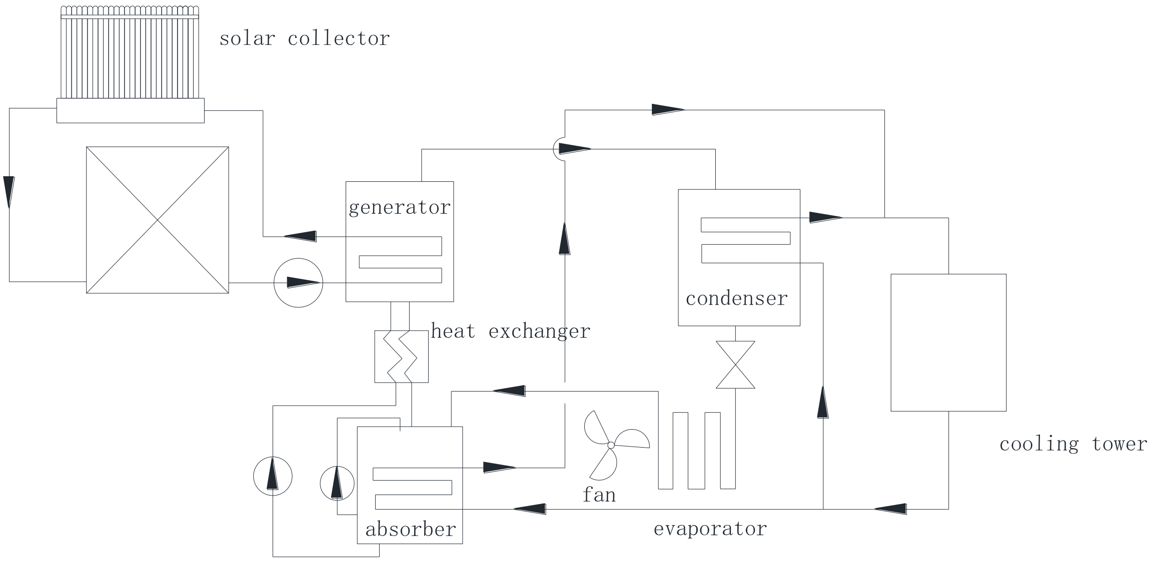

Fig. 1 Solar energy LiBr absorption refrigeration system diagram

3. Literature References

3.1 Parameter Selection Of Each State Point.

The system sets the refrigeration capacity Q=7kW, the outlet cold air temperature is selected according to the user's requirements. This design takes into account the requirements of the user and the rich temperature of the cooling temperature, and selects the cold air temperature of 24℃. This project is designed as a single effect absorption refrigeration unit. According to Table1, the temperature of the heat source is =85℃, and the temperature of the vacuum tube solar collector can reach 85 degrees centigrade under the condition of good sunlight. Take (condenser and absorber cooling water are connected in parallel).

Table1 Common given parameters and determination principles

parameter	Principle of determination
Refrigerating capacity	Set required cooling capacity according to user requirements
Freezing water outlet temperature	It is usually 7 ℃, and the three nominal working conditions of the country's current standards are 7℃, 10℃, 13℃.
Cooling water inlet temperature	Usually set to 32 ℃, and can also be set according to special requirements.
Heat source parameters	For single effect lithium bromide absorption refrigeration system, the saturated steam with a gauge pressure of 0.03-0.15 MPa or a hot water with a temperature higher than 85 ℃ is usually chosen.

3.2 Thermodynamic Coefficient.

When the lithium bromide absorption refrigeration cycle system works, the ratio of the cooling quantity released to the environment and the heat absorbed by the system is called the thermal coefficient, that is, the performance coefficient COP. For the single effect absorption refrigeration system, the ratio of the refrigerating capacity produced by the evaporator to the heat added by the driven heat source hot water in the generator.

$$\mathrm{COP}=\frac{Q_E}{Q_G}=\frac{q_e}{q_g} \tag{1}$$

Under certain conditions, the larger the thermodynamic system is, the higher the economic performance of the refrigeration cycle is.

4. Conclusion

This design combines the solar heat utilization technology with the absorption refrigeration technology. Through the rational selection of the design parameters, the thermal load and flow rate of the main equipment in each link of the refrigeration system are calculated, and the heat balance error of the refrigeration system is calculated and checked. Based on the basic principles of thermodynamics, the performance indexes of the system are analyzed, including performance coefficient COP, thermal integrity and heat consumption.

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