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LPG REFRIGERATOR SYSTEM

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ABSTRACT: This work is the result of an experimental observation to evaluate the coefficient of performance (COP). In LPG 56.5% butane, 24.4% propane and 17.2% isobutene are present. This research paper is an experimentally evaluated result of COP which is the effect of changing capillary tube length. LPG is economical and it is environment friendly by the help of which global warming potential (GWP) decreases and ozone depletion potential is negligible. LPG is present in refineries as byproduct we can predict optimal result of cooling effect suited operating condition of regulating valve and capillary tube of the system. In this system evaporator temperature slows down and it reaches to 5***°C***.

Keyword: LPG refrigerant, refrigeration effect, household kitchen, COP, environment friendly.

1. Introduction

In all over world electricity consumption is an issue in India rural areas are much more effected due to lack of electricity while Indian government is not able to provide continuous electricity supply. People in rural and urban areas uses refrigeration for different purposes to store medicine, cold storage, domestic kitchen.

LPG refrigerator work on the principle that the change of LPG which is present in liquid form changed into gaseous form. Expansion of LPG takes place due to expansion pressure reduces and volume increases. Due to reduce in pressure temperature also reduces because temperature varies according to pressure variation. Temperature drop produces refrigerating effect and this refrigerating effect is used for cooling purpose. LPG refrigerator provide refrigeration as well as it reduces global warming effect [1].

Materials and Method

2.1 Materials

In this process LPG is used as refrigerant as a cooling medium in refrigerator and it replace the conventional refrigerant. It performed on the principle that LPG present in liquid form changed into gaseous form and expansion of LPG takes place due to expansion in LPG,pressure decrease and volume increases. Temperature also decreases and an effect is produced which is known as refrigerating effect [2].

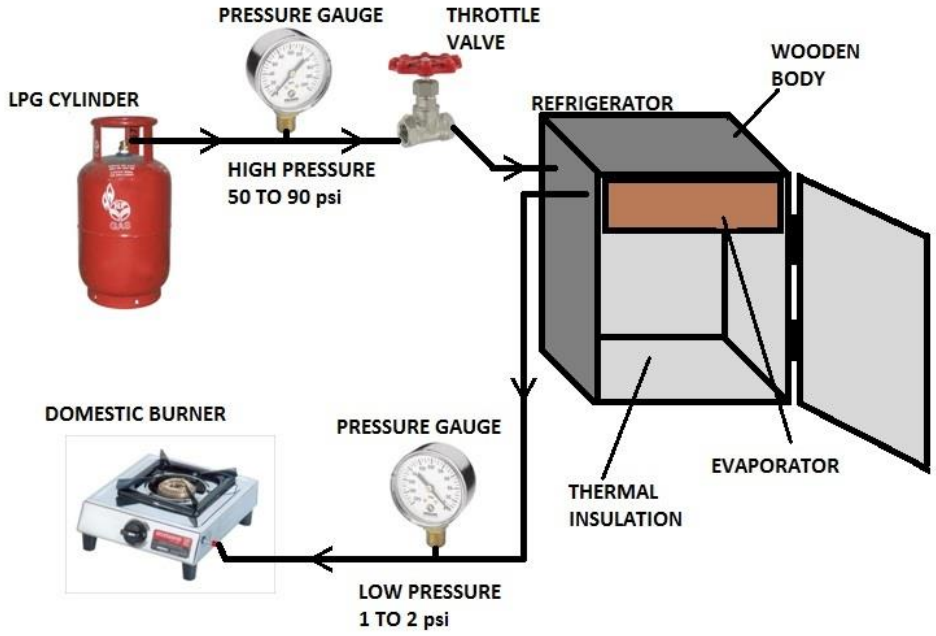

Fig. 1 Line Diagram of Refrigeration Process

2.2 Methods

LPG is known as Liquefied petroleum gas. LPG made by mixture of propane and butane. LPG is used as heating fuel, for domestic purpose [3]. Capillary tube is made of copper and its internal diameter is very small. Length of capillary tube is very long and it is coiled which has many number of turns and it occupies less space in a LPG refrigeration system. Internal diameter of capillary tube to in capillary tube pressure of LPG refrigerant is depend on diameter and length of capillary tube [4]. Evaporator is the most important part of refrigeration system. With the help of evaporation cooling effect is produced in refrigeration system. Evapo1rator are heat exchanger surfaces and it transfer the heat from the substance to be cooled. Evaporator size, shape varies and they are classified in different manner [5].

Pressure gauge is most commonly used mechanical gauge. It is a stiff flattened and made of metal tube bent into a circular shape. Fluid enters inside the tube whose pressure is to be measured. One end of tube is fixed and other is free to move inward or outward, pressure gauge responds between fluid pressure and outside atmospheric pressure [6]. When a gas in steady flows passes through a construction, e.g., in an orifice or valve, it normally experiences a change in temperature. This is in part due to changes in kinetic energy. The first law of thermodynamics, such a process is isenthalpic and one can usefully define a Joule-Thomson coefficient as:

$$\mu_{JT} = \left(\frac{\partial T}{\partial P}\right)_H$$

a measure of the change in temperature which results from a drop in pressure across the constriction.

Inversion curve: In this process (T-P) diagram, the region inside the curve where $\mu>0$ is called cooling region because in this region temperature decreases and the region where $\mu=0$ is called inversion point and temperature remains constant. The region where $\mu<o$ is the heating process because of increase in temperature, and this is called joule Thomson coefficient.

CONCLUSION

From observation we have summarized that high pressure LPG gas is stored in a cylinder which is at 12.14 bar pressure and its weight is 14.5 kg. Propane is eco-friendly as compared to conventional refrigerator and it is used as an alternative form in place of CFCs. In capillary tube inner diameter increases and flow rate in even increases. It was notice that change in geometry in capillary tube results in increase in COP of system [7].

The COP of LPG refrigerator was higher than that of R134a and its percentage is about 7.6 %. LPG refrigerator cooling capacity is 3-4 times higher than conventional refrigerant. It looks like propane/butane is most relevant alternative refrigerant. LPG is an alternative refrigerant which helps to control ozone depletion potential and also global warming potential [8].

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