The Effect of Using Lauric Acid on Cooler Boxes and Peltier as a Media Cooler Box

AHMAD FAUZI1, DODY IRAWAN1✉, FUAZEN1, RAUDHATUL FADHILAH2
[1]Department of Mechanical Engineering
[2]Department of Chemistry Education
Pontianak Muhammadiyah University
Ahmad Yani Street No. 111, Pontianak,
INDONESIA
ahmadfauziskd28@gmail.com ,* irawan.doddy@unmuhpnk.ac.id(corresponding author),
fuazen@unmuhpnk.ac.id ,raudhatul.fadhilah@unmuhpnk.ac.id,

Abstract:-Ice pack consumption in the refrigeration industry is currently increasing. Ice packs are able to maintain temperature, but the use of ice packs is not able to maintain a stable temperature because the ice packs melt quickly, therefore the author is looking for other cooling alternatives that can maintain a stable temperature and have a relatively longer cooling time. The research carried out in this work was to carry out an experiment using a factorial design with the independent variable: lauric acid concentration with variations (100g, 150g, 200g, 250g) and (time 2 hours) with 2/3 replications. The dependent variable is the cooler box temperature. As a control, ice packs were used with a concentration of 10 ice packs. At this stage, a study was carried out on Phase Change Material (PCM) made from Lauric Acid and de ice pack as a controlThe first step before carrying out an experiment to see the performance of the PCM being made is to determine the location of the thermocouple in the coller box. In this research, Laurid Acid can be used as a coolant that is able to maintain room temperature. Based on tests carried out for 2 hours, laurid acid was able to maintain a temperature of up to -1.8^{0}C, while at room temperature the cooler box can reach a temperature of -11.0^{0}C. So laurid acid is worthy of being used as an alternative as a cooling medium besides ice packs because it is able to stabilize temperatures.

Key words: cooler box, lauric acid, ice pack, peltier.

1 Introduction

Technological progress is currently starting to develop rapidly in Indonesia, especially industrial technology and is starting to become more modern. This is marked by many changes in all business fields, such as the refrigeration industry using cooler boxes. Of course, this has a positive impact, especially in the industrial sector, currently many industries are starting to compete fiercely. To achieve maximum or best results, many industries are now starting to be more careful in selecting and determining their machines and production equipment. Meanwhile, the cooling technique using ice cubes is a method that from the past until now is still widely used by the general trading community. In fact, the costs incurred for these ice cubes are very inflated due to the limited durability of the ice cubes and their single use[1].

Currently, there are many who offer a variety of cooling equipment, including cooler boxes. The general use of this cooler is to store food ingredients such as vegetables, food and drinks so that they maintain their freshness. Leaf vegetables are vegetables that very quickly decline in quality or freshness. Based on research that has been conducted, the decline in the quality of vegetables in developing countries can reach 40% to 50% because temperature is the most important environmental factor that influences damage**[**2]. One treatment that can be done is by conditioning the temperature of fresh vegetables[3]. Storing vegetables at a temperature of 7-10^{0}C can maintain vegetable freshness for 2.3 days[4]. Apart from that, even in the food industry, transport vehicles such as (trucks, box cars) are equipped with refrigerators. however, some refrigerators use a compression system, for example household refrigerators. The compression system has a high COP (coefficient of performance), but its compactness is still low, it is heavy because it consists of large components, and it consumes very high power[5].To provide a different impact, this cooler box technology uses materials called lauric acid, ice pack, and peltier as cooling efficiency media for cooler boxes and provides resistance to the temperature of a cooler box, and these components are starting to be widely used because