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Thermoelectric-based cooling system (Time New Roman 14 bold, left-aligned, only the beginning of the first word with a large letter, so other words are lowercase only, except for the name of the place or person), maximum 20 words. Remember that your paper must be submitted in a DOC file!!!! and written in English!!!!!!.

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ABSTRACT

The use of refrigerator and air conditioner in human life causes increase in use of hydrocarbon and fluorocarbon each year. Hydrocarbon and fluorocarbon are hazardous subtances that can make a hole in ozone that cause increase in receive of ultraviolet on earth, that will give negative impact on human health. Thermoelectric refrigeration as a solid state heat pump is a safe solution to subtitute the used of hidrocarbons and fluorocarbons based refrigerator and air conditioner. The experiment is conducted to test a thermoelectric based refrigeration system which uses water as a working fluid. The result shows that refrigeration system will be optimum at 6V and 2.24A of electricity consumption, and 0.5 and 1 litre/minute of water flowrate. While Coefficient of Performance (COP) of the system is 0.86. Italics in English Time New Roman 10. Abstract content Introduction, objectives, methods, results and conclusions. ***Maximum 250 words.***

1. INTRODUCTION (Time New Roman 10 bold, this heading is numbered 1, 2, 3 etc., all caps)

Excessive exposure to ultraviolet rays is known to cause skin cancer. (The beginning of the paragraph is written jutting inward by 1 cm. Written in Time New Roman 10. Contains the background, research objectives

and previous research citations of oneself or others that have been journaled or seminared or in the form of books. If there is no citation in the introduction, then the article is immediately rejected.

1.1 Sub-heading level 1 (Time New Roman 10 bold, written in lowercase letters only at the beginning of the sub-heading with uppercase letters)

Hydrocarbons are one of the refrigerants that are widely used in refrigeration systems. Hydrocarbons are substances that are harmful to ozone. How to write citations is as follows: If the substance is released into the atmosphere because it will cause damage to the ozone layer in the stratosphere which causes an increase in ultraviolet rays received by humans on earth, Wirawan (2018), Darno et al. (2018), Joni and Susi (2018). Or it can also be written If the rainy season, almost all regions in Indonesia are affected by floods (Wirawan, 2018; Darno et al., 2018; Joni and Susi, 2018).

1.1.2 Sub-heading level 2 (The maximum sub-heading is only up to level 2, written 10 Time New Roman bold, capital letters only at the beginning of the sub-heading)

Widianto et al. (2014) (writing citations can be like this at the beginning of the paragraph) conducted a study on the trial of refrigerated fish crates for mobile fish traders. The fish crate is in the form of a box with a volume of 33 liters that has inner walls made of aluminum and insulators made of polyurethane. Putra and Repi (2015) (or like this too) designed a thermoelectric-based cooler box for the storage of vaccines and medicines. The volume of the box to be cooled is 4.8 liters, using 4 thermoelectrics with a total power of 42 watts.

2. RESEARCH METHODS

This study is an experimental study with an apparatus scheme as seen in Figure 1 and Figure 2. In the research method, the tools and materials, the working principle of the tool when the data is taken or tested, must be written, but not the research procedure!!!. It also contains the constraints or settings and variables of what variables to be studied. The equipment is tried to have specifications, accuracy and resolution. Images of research tools must also be explained as clearly as possible so that readers can easily understand them.

Figure 1. Experimental apparatus (how to write a picture caption, letter 10 Time New Roman, capital letters only in the first word, center if the caption is not more than 1 line)

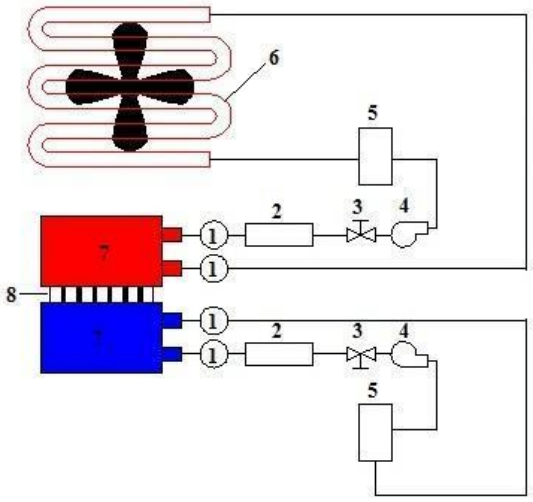

Figure 2. Apparatus scheme. 1. Temperature monitoring, 2. flowmeter, 3. faucet, 4. pumps, 5. reservoir, 6. radiator, 7. waterblock, 8. thermoelectric, 9. tap, 10. measuring cup (written Time New Roman and justify because it is more than one line, no need for every word to be capitalized)

Example of table writing. The specifications of the tools used in this study can be seen in table 1.

Table 1. Tools and materials (Time New Roman 10 letters, capital letters on the first word only, written in the center, if more than one line, then written justify, no vertical lines only the initial horizontal line, header cap, and table cap, the image position is always in the center or center)

Name	Specification
Thermoelectric	TEC1-12706
Radiator	Aluminum material, length x width x thickness = 274 x 118 x 311 mm
Pump	Max 3 l/minute
Flowmeter	0,8 – 8 l/minute
Temperature monitor	Digital thermometer
Stop kran	Ball valve model
Waterblock	Aluminum Length x width = 40 x 40 mm
Reservoir	Diameter x tinggi = 50 x 240 mm
Radiator fan	Size 120 x 120 mm Voltage 12 Volt DC

Example of writing equations using Equation3 or the like, if typed using MSWORD then click insert, object, in the selection box select equation 3 if it is not installed first, Mathtype Equation can also be installed. Equations are written justify and are numbered ordinally, see the example below.

The rate of heat transfer dissipated from the thermoelectric heat side through the radiator can be calculated using the equation (Cengel and Ghajar, 2015):

$$Q_h = m_c C_{ph} (T_{hout} - T_{hin})$$

(1)

where Qh is the heat produced (watts), mc is the mass flow rate (kg/s), Cph is the type of heat of the working fluid (J/kgK), Tout is the outlet temperature (K) and Tin is the inlet temperature (K).
The cooling capacity of the system can be calculated using the equation:

$$Q_c = m_c C_{pc} (T_{cout} - T_{cin}) \quad Q_c = m_c C_{pc} (T_{cout} - T_{cin})$$

(2)

Where Qc is the cooling capacity (watts), mc is the mass flow rate (kg/second), Cpc is the type of heat of the working fluid (J/kgK), Tcout is the outlet temperature of the thermoelectric hot side (K), and Tcin is the temperature of the inlet temperature of the thermoelectric cold side (K)

The magnitude of the mass flow rate can be calculated using the equation:

$$m_c = \frac{\rho Q}{60} \quad m_c = \frac{\rho Q}{60}$$

(3)

3. RESULTS AND DISCUSSION

The results must be discussed, analyzed, analyzed, explained and compared or confronted with previous research, either own research or other people's research that has been published in the form of a journal or proceeding. The magnitude of the electric current in the use of 6, 9 and 12 V thermoelectric voltages can be seen in table 2.

Table 2. Electrical current and voltage

Voltage (V)	Current (A)
6	2.24
9	3.23
12	4.09

The results are presented in the form of tables or figures. An example of the image below. The temperature on the cold side at 6V can be seen in figure 3. At 6V, the cold side temperature at 30 minutes with flow discharges of 0.5, 1 and 1.5 liters/minute is 22.5, 23.1 and 23.4°C respectively. The test results show that the radiator working fluid flow discharge of 0.5 liters/minute produces the lowest cooling temperature of 22.5°C. The position of the image is always in the center, the capsion below the image and the center if it is not more than one line. Images should be clear, easy to read, not chaotic.

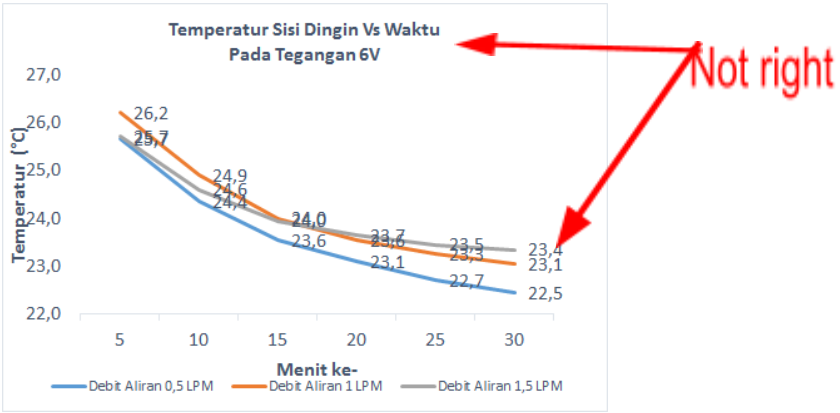

Figure 3. Cold side temperature at 6V (this is an incorrect example, because there are too many numbers in the picture. Words inside the figure must be written in English!!!

This means that at a flow discharge of 0.5 liters/minute, the radiator can dissipate heat better than a flow discharge of 1 and 1.5 liters/minute.

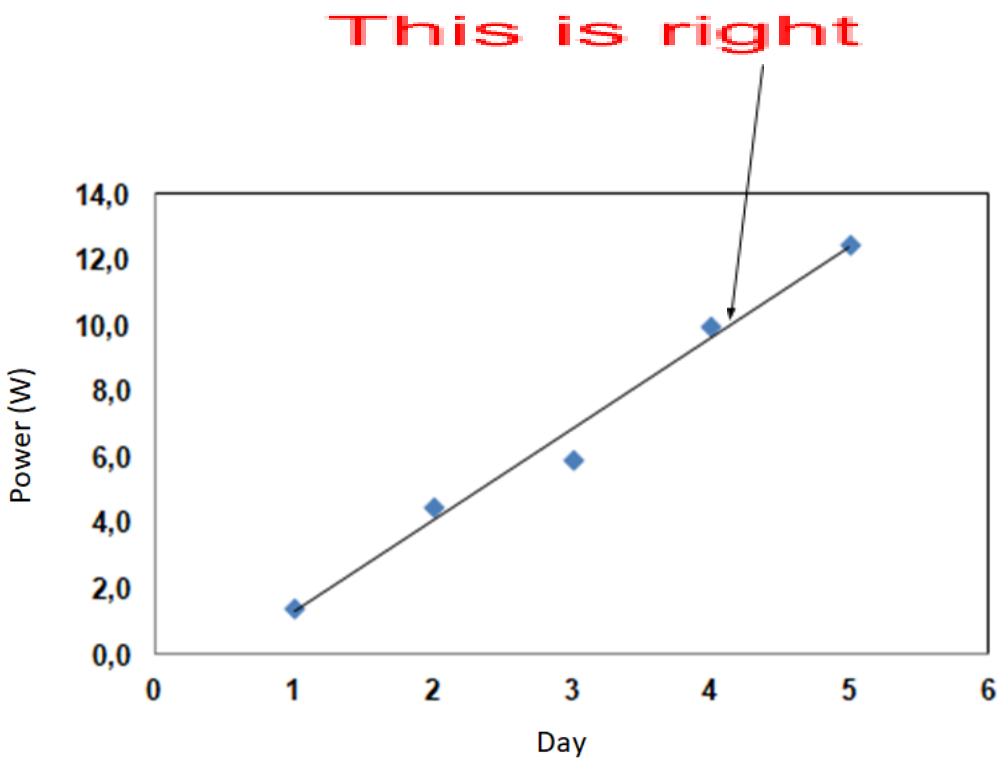

Figure 4. The relationship between day to day and power (this is a good example, clear and not chaotic, the outer box does not exist, but there is an inner box, there is no horizontal or vertical line line)

4. CONCLUSION

From the results of the experiments that have been carried out, several findings have been obtained. Based on the voltage used in the thermoelectric, the cooling system that produces the lowest temperature is the one with a voltage of 9V. Meanwhile, the system that produces the highest COP is the system with a voltage of 6V. Based on the flow discharge of the working fluid of the radiator used, the cooling system that produces the lowest temperature and the highest COP at voltages of 6V, 9V and 12V respectively is at the flow discharge of the working fluid of 0.5 and 1 liters/min, 0.5 liters/min and 0.5 and 1 liters/min.

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NOMENCLATURE (if available, Time New Roman 10 bold, no numbering required)

A_{abs} : Absorber area (m^2)
A_c : Collector area (m^2)
A_g : Glass area (m^2)
C_p : Specific heat (J/kgK)

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