

Research Title:Development of A Refrigerator Using Thermoelectric Cooling Device

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Abstract

This research work present the development of a small size refrigerator on which its hot side is installed by a thermoelectric cooler (TEC), a heat sink and an electric blower. The heat sink is made of copper, the total size $68 \times 89 \times 68 \text{ mm}^3$, containing 33 copper fins of the size $62 \times 62 \times 0.3 \text{ mm}^3$ each. On the other hand, its cool side is comprised of a cool plate which is made of an aluminum sheet of size $50 \times 60 \times 10 \text{ mm}^3$ and its four sides is surrounded by an insulator whereas one of its flat side is open to supply cool air. The proposed refrigerator is constructed using thermoelectric cooler model TEC 127-05 of the size $40 \times 40 \times 4 \text{ mm}^3$ with its average Seebeck Coefficient equal to $0.0399 \text{ V/}^\circ\text{C}$. it is found that with a DC power supply of 12 volt and 4 Amp, temperature of the cool plate decreases from room temperature to -4°C within 10 minutes. In addition, the model DT6-4 thermoelectric cooler of the size $25 \times 25 \times 3 \text{ mm}^3$ from Marlow Industries is connected serially to formulate the proposed refrigerator. By supplying a direct current voltage 24 volt, this setup is able to decrease the temperature down to -4°C as well. The heat sink used in this research work is capable of working with a thermoelectric cooler of not exceed than 70 watts.