ABSTRACT

In this research studied about the making of nanoparticles and its application in refrigerator. Nanoparticles have better characteristics than the large sizes particles. On this research, material ZrO_2 are used because of the availability of the main ingredient ($ZrSiO_4$) to make ZrO_2 are rich in Indonesia and thermal conductivity which have potentially used as nanofluida. Nanoparticles can be used in everyday life, such as on the refrigerator. Nanoparticle ZrO_2 mixed with refrigerant oil which is here in after referred to as nanofluida, to increase the performance of the refrigerator.

From previous studies it is known that nanoparticles can increase the thermal conductivity of the fluid at the base of nanofluida. In this study, nanofluida made with dispersing nanoparticles ZrO_2 into refrigerant oil R-134a. ZrO_2 nanoparticles are made through two stages, namely the caustic fusion and synthesis method of sol-gel. To ensure that the results of the synthesis of nanoparticles in the form of ZrO_2, XRD analysis is done, then the surface area meter, and TEM. Furthermore, the nanofluida that has been created is used as a lubricant in the compressor refrigerator as implementation of the application technology of nanoparticles on the refrigerator. XRD data shows that the crystal-shaped ZrO_2 monoklinik baddeleyyit and ZrO_2 cubic. Data measurement with surface area meter shows the nanoparticle ZrO_2 has a surface area of 73.952 type m^2/g and measuring results with TEM showed the nanoparticles ZrO_2 has a size of 14 nm. The test results with the refrigerator shows that nanoparticles ZrO_2 increase cooling machine performance 15.62% of the electric power consumption and lowering of 8.28% at concentrations 0.105% volume ZrO_2 nanofluida compared to performance and power consumption of the electrical engine coolant R134a oil use.

***Keywords**: nanoparticle, nanofluids, ZrO_2, caustic fusion, sol-gel, performance, refrigerator*