CHAPTER V

CONCLUSIONS AND RECOMENDATION

The following conclusions can be stated based on the observations derived from the experiments conducted in this study.

1. The temperature profile is averaged over the entire bed volume thus is the function of time only. The radial temperature profile rate of NaCl is more than that KNO_3 and $NaNO_3$ at 3, 6, and 9 cm on the every position. The radial temperature profile of NaCl, KNO_3 and $NaNO_3$ with a oil flow rate of 0.58 kg/s at 3 cm was 85-233°C, 6 cm was 55-170°C and 9 cm was 24-48°C respectively. The radial temperature profile of NaCl, KNO_3 and $NaNO_3$ with a oil flow rate of 0.87 kg/s at 3 cm was 90-244°C, 6 cm was 47-136°C and 9 cm was 36-46°C respectively. The radial temperature profile of NaCl, KNO_3 and $NaNO_3$ with a oil flow rate of 1.16 kg/s at 3 cm was 99-259°C, 6 cm was 56-160°C and 9 cm was 34-51°C respectively. The radial temperature profile of NaCl, KNO_3 and $NaNO_3$ with a oil flow rate of 1.45 kg/s at 3 cm was 107-270°C, 6 cm was 73-174°C and 9 cm was 36-113°C. The thermal distribution of temperature of the NaCl for TR inside the thermal distribution of temperature in the range of 185-220°C, TR middle the thermal distribution of temperature in the range 95-150°C and TR outside the thermal distribution of temperature in the range of 25-50°C. The thermal distribution of temperature position of the KNO_3 for TR inside the thermal distribution of temperature in the range of 150-200°C, TR middle the thermal distribution of temperature in the range 55-125°C and TR outside the thermal distribution of temperature in the range of 25-45°C. The thermal distribution of temperature position of the $NaNO_3$ for TR inside the thermal distribution of temperature in the range of 125-200°C, TR middle the thermal distribution of temperature in the range 65-125°C and TR outside the thermal distribution of temperature in the range of 25-40°C For the thermal distribution of NaCl for TR inside, TR middle and TR outside were optimum of temperature down to $NaNO_3$ and KNO_3 respectively.

2. The performance of thermal storage system which NPCMs for Comparing of NPCMs with oil flow rate of 0.58 kg/s for the KNO_3 and $NaNO_3$ bed took 620 minutes for complete charging whereas NaCl gets completely charged within 500 minutes respectively. The stored thermal energy as a function of time is depicted for oil flow rate of 0.87 kg/s. The KNO_3 and $NaNO_3$ bed took 500 minutes for complete charging whereas NaCl gets completely charged within 300 minutes respectively. Stored thermal energy as a function of time is depicted for oil flow rate of 1.16 kg/s. The KNO_3 and $NaNO_3$ bed took 500 minutes for complete charging whereas NaCl gets completely charged within 270 minutes, respectively. The stored thermal energy as a function of time is depicted for oil flow rate of 1.45 kg/s. The KNO_3 and $NaNO_3$ bed took 450 minutes for complete charging whereas NaCl gets completely charged within 300 minutes, respectively. The discharging time of NaCl was 165 min, $NaNO_3$ is 195 min and KNO_3 was 155 min, respectively. Comparing substances (NPCM) with oil flow rate $NaNO_3$ discharging heat was more slower than KNO_3 and $NaNO_3$, so $NaNO_3$ is appropriate to store thermal energy. Comparison of NPCMs with oil flow rates for NaCl were charging and discharging heat transfer than KNO_3 and $NaNO_3$ due to the high heat capacity and low thermal conductivity. For the thermal stored of NPCMs that compared for flow rate 1.45 kg/s were summarized as follows: flow rate, faster charging are optimum of flow rates 1.16, 0.87 and 0.58 kg/s respectively. The thermal stored of NaCl was lain from 5,712-5,912 kJ, KNO_3 was lain from 7,350-7,939 kJ and $NaNO_3$ was lain from 6,623-6,930 kJ respectively. The thermal energy stored for experimental results were get with along the KNO_3, $NaNO_3$ and NaCl respectively. For the thermal energy recovered of NPCM that compared for flow rate 1.45 kg/s was summarized as follows: flow rate, faster charging are optimum of flow rates 1.15, 0.87 and 0.58 kg/s respectively. The thermal energy recovered of NaCl was lain from 4332-6028 J, KNO_3 was lain from 6367-6887 J and $NaNO_3$ was lain from 5453-7620 KJ respectively. The thermal energy recovered for experimental results of KNO_3 more than that were $NaNO_3$ and NaCl respectively. The thermal Energy efficiency of NaCl, KNO_3 and $NaNO_3$ were in the range of 66-70% for discharging at a temperature of 100°C.

3. The instantaneous energy stored of NaCl time required for storing 5,769 kJ is 600, 520, 360 and 340 min for mass flow rates of 0.58, 0.87, 1.16 and 1.45 kg/s respectively, and at average charging rates of 160, 162, 192 and 217 W respectively. The time required of KNO_3 for storing 5,769 kJ is 270, 235, 180 and 145 min for mass flow rates of 0.58, 0.87, 1.16 and 1.45 kg/s respectively, and at average charging rates of 316, 353, 465 and 545 W respectively. The time required of $NaNO_3$ for storing 5,769 kJ is 365, 335, 250 and 245 min for mass flow rates of 0.58, 0.87, 1.16 and 1.45 kg/s respectively, and at average charging rates of 253, 287, 384 and 394 W respectively.