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PERFORMANCE UPGRADATION OF HEAT EXCHANGERS – AN EXPERIMENTAL STUDY

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ABSTRACT

In this study, the performance of the heat exchanger is upgraded by using static material. The heat transfer rate is improved by employing static inert materials. The hot water is used on shell side. The cold water is used in tube side. It was witnessed that the heat transfer rate increased remarkably.

Key words: Performance, inert material.

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1. INTRODUCTION

Heat exchangers are widely used for transferring the heat from one fluid to another. Several heat exchangers are used widely in industries. The heat exchangers suffer from disadvantages like lower heat transfer rate. Recently the emphasis is on improving the performance of the heat exchangers. The inert material is deployed to increase the performance of heat exchangers.

The objective of this study is to analyze the influence of inert materials in upgrading the performance of a heat exchanger[1-4].

2. EXPERIMENTAL METHOD

The cold water is pumped through the shell side of the heat exchanger.

The flow of the cold water is controlled by using the gate valve. The hot water which is generated by using a heating coil is circulated through the tube side[5-10].

Initially experiments were conducted without using the inert material to find the baseline heat transfer rate. Then experiments were conducted using inert materials to find the increased heat transfer rate. The terminal temperatures at hot water entry and exit were noted. Likewise the temperatures at cold water entry and exit were noted. .

3. RESULTS AND DISCUSSION

Table 1, illustrates the experimental results of heat exchanger when inserts were not used[11-16]. Table 2, depicts the results after using the inert materials.

Table 1 Results of without inert material

Mass flow rate (kg/s)		Shell Side (°C)		Tube side (°C)		Overall heat transfer coefficient w/m^{2}K
Shell side	**Tube side**	**Thi**	**Tho**	**Tci**	**Tco**	
0.016	0.033	80	78	30	33	196
0.02		80	76	30	36	200
0.025		80	73	30	40	207
0.033		80	70	30	45	219
0.05		80	68	30	47	231

Table 2 Results of inert packing

Mass flow rate (kg/s)		Shell Side (°C)		Tube side (°C)		Overall heat transfer coefficient w/m^{2}K
Shell side	**Tube side**	**Thi**	**Tho**	**Tci**	**Tco**	
0.016	0.033	80	60	30	39	232
0.02		80	57	30	41	233
0.025		80	55	30	45	238
0.033		80	49	30	51	241
0.05		80	46	30	55	244

From table 1 and 2 it is clear that the heat transfer has been upgraded using inert materials. The inert materials, doesn't move on its own, but pushes the fluid from wall of pipe to the center, thereby increasing the heat transfer. In addition the inert materials divide and recombine the fluid which creates turbulence. Because of this the inert material has upgraded the heat transfer[17-20].

4. CONCLUSIONS

The effect of inert material in upgrading the heat transfer in heat exchanger is studied. The experiments were done with and without using inert materials. It is evident that the inert materials are capable of upgrading the heat transfer in heat exchangers.

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