

# “Modified Desert Cooler (MDC)”

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## Abstract:

“Modified Desert Cooler (MDC)” as the name suggest that it is the modification of the conventional cooler. It is the Air Conditioner cum refrigerator for people who cannot afford costly equipments like air conditioner, refrigerator and other such appliances. It cools the air more than the conventional Desert cooler. The modified desert cooler is developed for providing better cooling effect than conventional desert cooler. It also provides cold-pure water for drinking purpose comparatively at low cost than Refrigerator with the help of modifies Matka attached with it. It also decreased moisture content of the air coming through desert cooler upto some extent.

The MDC consists of a desert cooler with storage box, two concentric simple small size earthen pot known as modify Matka, a purifier, humidity controller and connecting tubes or pipes. Storage box provided in the desert cooler can be used to store regular food items, vegetables, fruits etc.

**Keywords :** Modified Desert Cooler (MDC) , Conventional Desert Cooler (CDC), Matka (Earthen Pot use for storing drinking water)

## 1. Introduction

Today in the 20<sup>th</sup> century, the world is facing a major problem of global warming due rapid industrialization. In India, during summer season the average temperature is about 40°C to 45°C. It even reaches up to 48°C to 50°C in the month of June. To maintain comfortable condition in (i.e. temperature & humidity) in the summer season various types of appliances are used such as ‘Air Conditioner’, ‘Coolers’, etc... These appliances are easily available in the market. In India, the average income of common man is not so high, common man cannot afford these appliances because of their high cost. Another problem is scarcity of electricity, especially in villages; the load shading is 14 to 16 hours a day.

This paper gives a solution for the above problem. . It is the modification of the desert cooler by attaching it with accessories such as ‘Purit’ water filter and modified earthen pot (Ranjan & Matka). With the help of these modifications we have achieved the following goals,

1. Air conditioning effect (temperature obtained is less than 8°C to 9°C as compared common cooler).
2. Filtered Cool water for drinking purpose.
3. Storage space for perishable goods.
4. Modified Desert Cooler reduces humidity to human comfort level.

This ‘Modified Desert Cooler’ is less expensive than other appliances available in the market (air conditioner, cooler, etc.) & consumes less electricity. The M.D.C. can be used in homes, offices, banks, auditorium halls, etc...

## 2. Description of Modified Desert Cooler (MDC)

The assembly of Modified Desert cooler consists of following components:

1. Desert cooler assembled with storage box.
2. Simple small size earthen pot known as Matka.
3. One big size earthen pot known as Ranjan.
4. Connecting tubes or pipes.
5. A draft with humidity controller.

The above figure shows the assembly of the project in which the desert cooler is connected with a new innovative cooling system with the help of connecting tubes. The water is circulated around storage box with the help of another connecting tube. The system is so assembled that the flow of water takes place on the principle of gravity. Thus for circulating water around the box & into the Ranjan we will not require any extra pump.

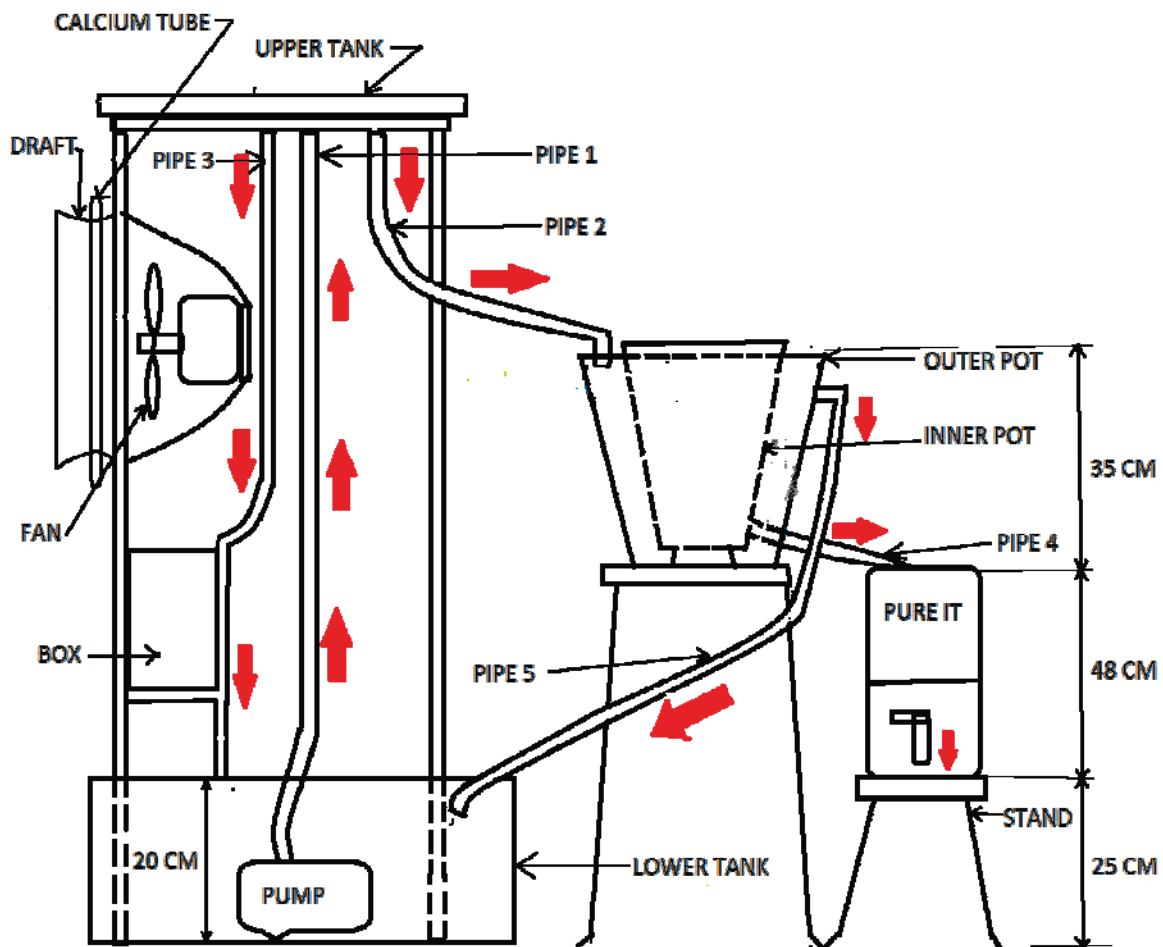


Fig. 1 Assembly of Modified Desert cooler

### 3. Working of MDC

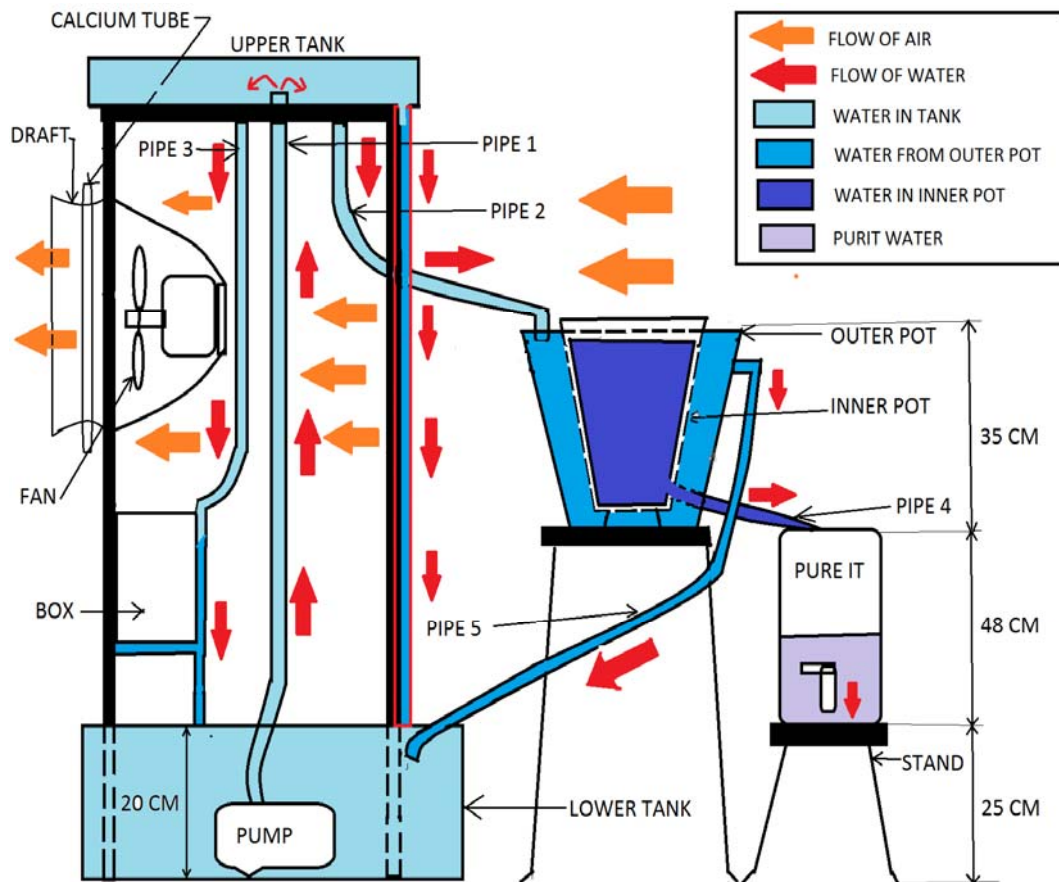


Fig. 2 Working of Modified Desert cooler

As soon as we start the cooler, submersible pump starts working and delivers the water through pipe1 to the upper tank. Generally in normal cooler the water returns directly into the lower tank with the help of a return pipe. But in Modified Desert Cooler, the water from the upper tank flows through pipe2 into the Ranjan. A pipe3 is connected to the upper tank. The water through pipe3 circulates around the storage box. Storage box is also provided with aspen wood fiber pad which help to maintain low temp inside storage box. Due to this, the temperature of the storage box becomes low. Thus it creates a suitable atmosphere inside the storage box to store perishable food items.

The water through pipe2 flows into the ranjan as shown in the fig2.. In this ranjan a small matka or earthen pot is kept. The water in the ranjan surrounds the matka. Due to this arrangement the water inside the matka becomes cold. Now ranjan has small pores in its walls. When water is poured into it, some of it seeps through these pores to its outer surface. On reaching there, it evaporates. The heat required for evaporation is taken from the Raman's outer surface and from the water in it. As a result, the temp of water which circulate in the gap between outer ranjan and inner matka decreases. This cooled water absorb the heat from inner mataka(containing drinking water) Thus making the water inside mataka cooler than the outside temperature.. The water in the ranjan is then supplied back to the lower tank through pipe5 and hence the cycle is repeated again and again. The water from the matka is then passed into pureit water filter through pipe4. Thus pure, cooler and cleaner drinking water is available from the filter for drinking purpose.

#### 4. Results and discussion

The outputs of the **MDC** are:

1. Cooled water for drinking purpose.
2. Lower room temperature.
3. Humidity of cooled air coming out from the MDC is low as compared to conventional desert cooler.
4. Cooled storage space for perishable items.

We verified these objectives by comparing the reading of

- Temperature of cooled water inside the Modified Matka with temperature of cooled water inside the conventional Matka.
- Room temperature using MDC and conventional desert cooler.
- Humidity of air coming from MDC and conventional desert cooler.

We have taken the readings in a room of volume 4000 cubic feet, dated on 12/02/2011, for six hours.

##### 4.1 Readings:

Table no.1 Initial condition

Sr. no	Conditions	Temperature
1.	Room temperature	36°C
2.	Water temperature in lower tank	36°C
3.	Temp. in storage box	34°C

Table no. 2 Comparison between temperature of water in conventional Matka & modified Matka.

Sr. no.	Time in minutes	Temp. (in °C) of water in conventional pot	Temp. (in °C) of water in modified matka
1	0	36	36
2	30	30	30
3	60	28	27
4	90	27	25
5	120	26	23
6	150	26	22
7	180	26	22
8	210	26	21
9	240	25	19
10	270	25	17
11	300	25	15
12	330	25	15
13	360	25	15

From the readings of table no. 2 we observed that in six hours the temperature of water in conventional pot (Matka) decreases from 36°C to 25°C, in last two and half hours the temperature of water remains constant at 25°C. In innovative cooling system, the temperature of water inside the modified Matka decreases up to 15°C, which is 10°C less than conventional pot.

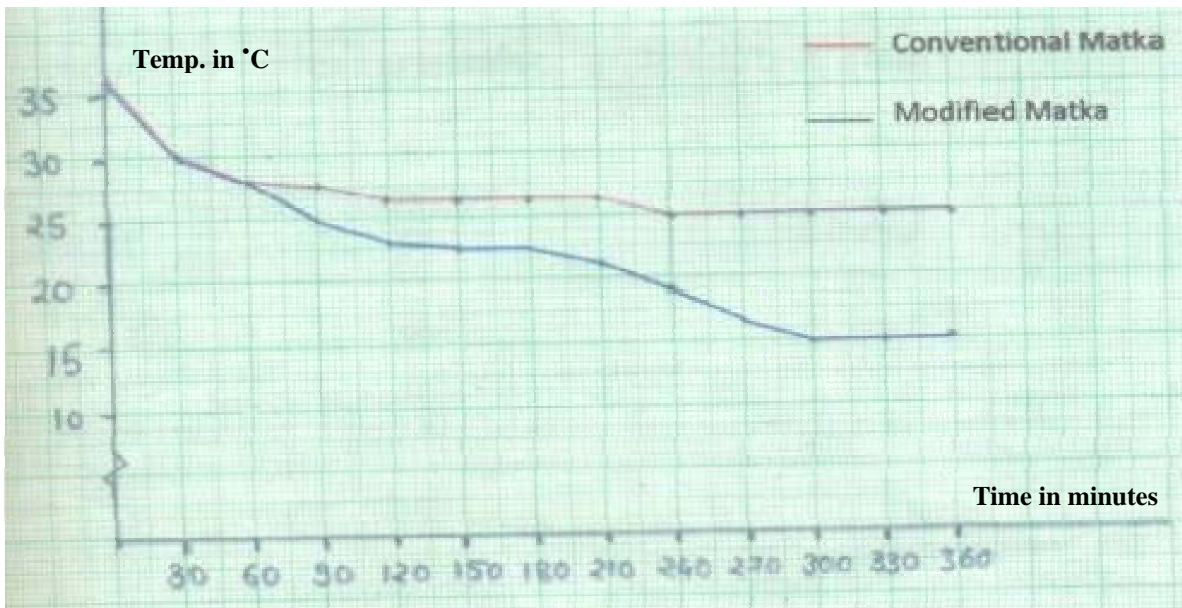


Fig. 3 Graph showing comparison between temperature of water in conventional Matka & modified Matka

Table no. 3 Comparison of room temperature using Conventional Desert Cooler & Modified Desert Cooler.

Sr. no.	Time in minutes	Conventional Desert Cooler (CDC). (Room Temp. in °C )	Modified Desert Cooler (MDC). (Room Temp. in °C )
1	0	36	36
2	30	34	34
3	60	32	32
4	90	31	30
5	120	30	28
6	150	29	26
7	180	29	24
8	210	28	23
9	240	28	22
10	270	27	22
11	300	27	21
12	330	27	21
13	360	27	21

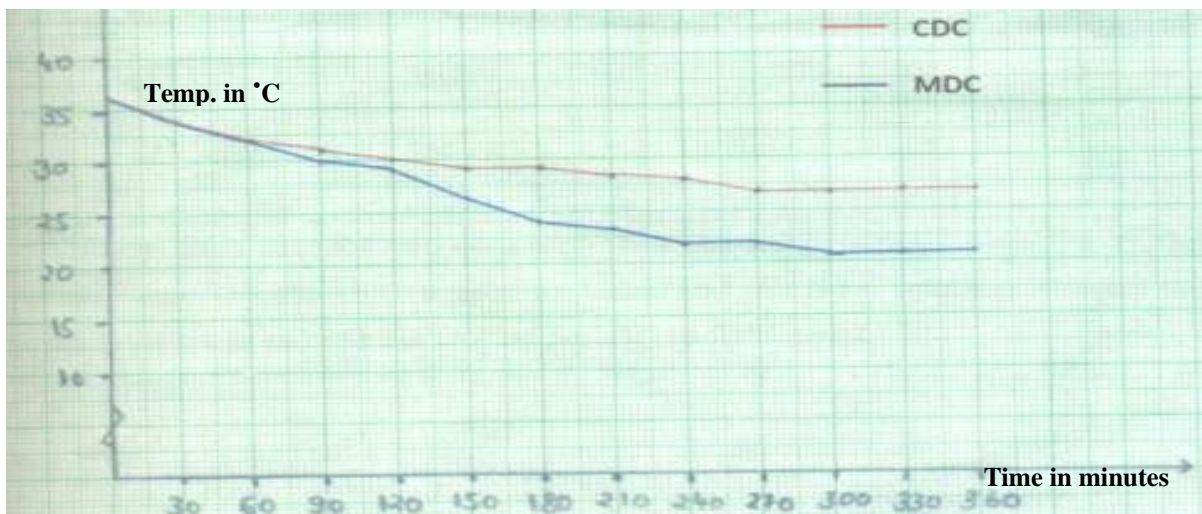


Fig. 3 Graph showing comparison between room temperature using CDC & MDC

From the readings of table no.3 we observed that in six hours the room temperature decreases from 36°C to 27°C by using conventional desert cooler, in last two hours the temperature of room remains constant at 27°C. While using MDC the room temperature decreases up to 21° C, which is 6°C less than conventional desert cooler.

Table no. 4 Temperature inside the Storage Box

Sr. no.	Time in minutes	Temp. (in °C ) inside the box
1	0	34
2	30	30
3	60	28
4	90	27
5	120	25
6	150	25
7	180	24
8	210	23
9	240	22
10	270	20
11	300	18
12	330	18
13	360	18

From table no. 4 we observed that the temperature inside the storage box decreases from 34°C to 18°C within six hours and last three readings remains constant. This temperature is suitable for storing perishable food items.

Table no. 5 Cost Estimation

Sr. No.	Component	Cost in Rs.
1	Desert Cooler	2700/-
2	Matka	80/-
3	Ranjan	100/-
4	Storage box	400/-
5	Humidity controller	60/-
6	Pureit water filter	1000/-
7	Connecting pipes	100/-
8	Aspen pads	200/-
	<b>Total cost</b>	<b>4640/-</b>

The cost of a normal air conditioner is approximately Rs. 28000/- and the cost of a refrigerator is about Rs. 6000/-; which quiet expensive than MDC. MDC provides us with both the facilities at an affordable cost of Rs. 4640/- only

## 5. Conclusions

The cost of a normal air conditioner is approximately Rs. 28000/- and the cost of a refrigerator is about Rs. 6000/-; which quiet expensive than MDC. MDC provides us with both the facilities at an affordable cost of Rs. 4640/- only. Thus MDC cools the air more than the conventional Desert cooler, it also provide cold-pure water for drinking purpose comparatively at low cost than Refrigerator. The modified desert cooler is developed for providing better cooling effect than conventional desert cooler. It is also used for cooling and purifying the drinking water. It will control humidity to the human comfort level. Because of its multifunctional abilities it is a better option.

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