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# Design and Fabrication of Marigold Flower Hydrosol Extraction Machine and Manure Making

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**Abstract:** India is the religious country with a huge population. And there are lots of Hindu temples present here. This devotion towards God comes with a price in the form of flowers. And these flowers create a lot of pollution in solid form and due to improper management of this waste create air pollution and other types of pollution which harm nature critically. In an average in India there are 60 cores tons of marigold flowers devoted to God and create such problems as we discuss. Hence to tackle such a situation in such a way to create some revenue from those wastes and also reduce pollution we design and fabricate marigold flowers hydrosol and manure extracting machine. This machine works on the water distillation process and represents a thermodynamic cycle. Here flowers get boiled with water and it creates steam of flower essences and get cold down into liquid form in the condenser and by this process we get hydrosol and manure (in boiler). There are also other processes to extract these items from flowers but the water distillation process is more easy, effective and simple than other processes and it creates absolutely low or no pollution.

## I. INTRODUCTION

In our day-to-day life we come to see lots of marigold flowers going to waste and creating pollution. To tackle these problems, we design and fabricate marigold flowers hydrosol and manure extracting machines which produce hydrosol and manure from marigold flowers. This hydrosol is very useful in many sectors such as cosmetics, Ayurvedic, and even also used for making perfume and diffusers due to its unique essences. And manure obtained from that boiler is fermented for several weeks for its proper decomposition and conversion into organic fertilizer. This fertilizer does not contain any inorganic material or any adulteration which makes it 100% natural and harmless for soil. This process works on the water distillation process. Here first flowers and water are taken to the container in a proper ratio after that container gets heated by an induction coil and leads to boiling water and flower mixture. This mixture generates mixed steam and this steam passes to the condenser. Inside the condenser that steam is converted into hydrosol and we also get manure from that boiled flower.

## II. COMPONENTS

- 1) **Pressure Cooker:** We use a pressure cooker as a boiler since it is airtight and prevents steam from escaping. It is used to perform water distillation on the flowers.
- 2) **Rubber Tube:** It is used to supply the steam generated in the boiler to the condenser coil for cooling.
- 3) **Copper Tube:** It is made up of a naked copper coil which is placed inside the condenser in a spiral form and steam passes through the copper tube continuously.
- 4) **Condenser:** It consists of copper tubing which helps to cool the hot steam. Its function is to condense the steam received through the rubber tube and convert it into liquid using cold water.
- 5) **Tap:** This tap is used to get hydrosol and oil separately by density difference.
- 6) **Container and Water Pump:** It is used to store and provide continuous cold water flow to the condenser to cool down steam.
- 7) **Induction:** It consists of an electric heating coil which is used to heat the pressure cooker to generate steam of flowers and water mixture.

## III. WORKING

- 1) Take the mixture of flowers and water in the pressure cooker.
- 2) Put that boiler on the induction coil.
- 3) And start the induction coil.
- 4) Induction coil heats up and also provides heat to the boiler.
- 5) Boiler heats up the water up to 100 °C and flowers inside it.
- 6) As the boiler's water reaches its boiling point it creates vapour of water and flowers.
- 7) This vapour flows through the pipe toward the condenser at 130 °C.

- 8) Condenser condense that vapour into liquid which is also called as hydrosol as it get continuous flow of cold water around that vapour contain pipe
- 9) This hydrosol is collected in another tank which also have small amount of oil and by this way we get our final product hydrosol and boiler mixture of water and flower is use as manure.

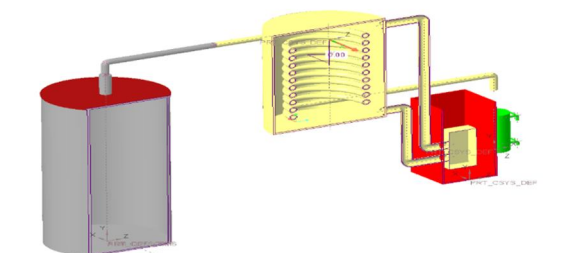


Fig 1.1: 3D CAD Model



Fig 1.2: Actual Model

#### IV. OBSERVATION TABLE

Experiment No.	Volume of flowers	Time of Heating (min)	Hydrosol Extracted (ml)	Initial water in cooker (liter)	Heat rate
1.	25	50	450	1	3
2.	50	57	400	1	3
3.	75	60	350	1	3
4.	100	65	325	1	3

Following table are the representation of the experiment that we have perform the study of the hydrosol after doing the some changes in quantity of flower.

- 1) 1<sup>st</sup> observation shows that if we take a 25 marigold flower and then mix it with the 1 liter of water and providing it the heat at the speed of 3 of heater then it will take 50 min and give 450 ml of hydrosol in this case the density of the hydrosol is low.
- 2) 2<sup>nd</sup> observation shows that if we take a 50 marigold flower and then mix it with the 1 liter of water and providing it the the heat at the speed of 3 of heater then it will take 57 min and give 400 ml of hydrosol in this case the density of the hydrosol is high in comparison with the hydrosol of observation 1.
- 3) 3<sup>rd</sup> observation shows that if we take a 75 marigold flower and then mix it with the 1 liter of water and providing it the the heat at the speed of 3 of heater then it will take 60 min and give 350 ml of hydrosol in this case the density of the hydrosol is high in comparison with the hydrosol of observation 1 and 2 .
- 4) 4<sup>th</sup> observation shows that if we take a 65 marigold flower and then mix it with the 1 liter of water and providing it the the heat at the speed of 3 of heater then it will take 65 min and give 325 ml of hydrosol in this case the density of the hydrosol is high in comparison with the hydrosol of observation 1 ,2 and 3.

Hence we perform the experiment and from the observation we conclude that as we increase the quantity of flower the quantity of hydrosol we get at the end of the process is less but the density get thicker and essence and aromatic property of the hydrosol get increase.



## V. OBJECTIVES

- 1) To reduce the pollution.
- 2) To manage waste of marigold flower.
- 3) To generate revenue from it.
- 4) To generate employment.
- 5) Help to provide medical material in ayurvedic sector.
- 6) To provide organic fertilizer.
- 7) To provide raw material in cosmetic sector.
- 8) To represent thermodynamic cycle with open body.

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