



# HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY

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Coimbatore – 641 032

Department of Chemical Engineering



## Patent Granted/Published Details

S.No.	Title of the Project	Name of the Principle Investigator/ Co-Principle Investigator	Partnered or Sponsored by	Outcome
1	Polyester Resin Loaded Nanocomposite Material for Carbon Dioxide Sequestration and The Method of Preparation Thereof	Dr. M Seenuvasan	Hindusthan College of Engineering and Technology	<b>Patent Granted (India)</b>
2	Production of Biodegradable Plastic from Organic Flour and The Method of Preparation Thereof	Dr. M Seenuvasan	Self-Funded	Patent Published
3	Magnetite Embedded Biochar as Nano-Sorbent for Effective Adsorption Of Textile Dye and The Method Therof	Dr. M Seenuvasan	Self-Funded	Patent Published
4	Medication Dose Preparation And Transfer System Using Artificial Intelligence Mechanism	Dr. M Seenuvasan	Self-Funded	<b>Patent Granted (German)</b>
5	A Sustainable Approached Toy Vending Machine Converting Waste Plastics	Dr. M S Vivek	Self-Funded	Patent Published
6	A New Technique for Solid Dust Removal Using Two Inlet Cyclone Separators	Mr. J Sathish	Self-Funded	Patent Published
7	A New Air Elutriator Coupled with Ceramic Filter Membrane for Separation Of Solid Particles from Gas Mixture	Mr. J Sathish	Self-Funded	Patent Published
8	Chemical Composition and Biological activity of Vanilla palmarum and Lippiaalba	Mr. Nagul Dev	Self-Funded	Patent Published

**APPLICATION NUMBER: 202041044259**  
**DATE OF FILING: 12/10/2020**  
**DATE OF GRANT: 08/06/2022**

# REPORT ON PATENT GRANTED

## TITLE OF THE INVENTION

**“Polyester resin loaded nanocomposite material for carbon dioxide sequestration and the method of preparation thereof”**

## NAME OF THE APPLICANT

**Hindusthan College of  
Engineering and Technology**



## DETAILS OF THE INVENTOR(S)



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## FIELD OF THE INVENTION

The present invention generally relates to the field of nanomaterial, in particular relates to a fabricated polyester resin loaded nanocomposite material for capturing and sequestering carbon dioxide from a fluid stream.

## OBJECTIVE OF THE INVENTION

- The primary objective of the present invention is to synthesize a polyester resin from jojoba oil.
- It is another objective of the present invention is to synthesize graphene oxide nanoparticle.
- It is yet another objective of the present invention is to fabricate polyester resin loaded graphene oxide nanocomposite material.
- It is another objective of the present invention is to capture and sequester carbon dioxide using the nanocomposite material.

## IMPACT ON SOCIETY

The outcomes of this work as follows,

- **Importance of Polyester Resins:** It has many advantages including the sustainability of the CO<sub>2</sub> feedstock, biodegradability, biocompatibility, oxygen barrier properties, high transparency, dielectric properties, and its potential for CO<sub>2</sub> sequestration. efficient utilization of PPC-based materials for various applications can reduce the dependence on fossil fuel– based polymers.
- **CO<sub>2</sub> Sequestration:** If carbon is sequestered, and emissions reduced, then the greenhouse effect will be reduced in the future, resulting in fewer warmer days as well as less occurrence of drought and other extreme weather cycles associated with climate change.
- **Benefits:** The present invention is advantageous over existing method wherein the present invention is free from toxic additives, recyclable and the obtained final nanocomposite can be used to sequester carbon dioxide from a fluid stream.





**INTELLECTUAL  
PROPERTY INDIA**

PATENTS | DESIGNS | TRADE MARKS  
GEOGRAPHICAL INDICATIONS



सत्यमेव जयते

भारत सरकार  
GOVERNMENT OF INDIA

पेटेंट कार्यालय  
THE PATENT OFFICE

पेटेंट प्रमाणपत्र  
PATENT CERTIFICATE  
(Rule 74 of The Patents Rules)

क्रमांक : 044141926  
SL No :



पेटेंट सं. / Patent No. : 398788  
आवेदन सं. / Application No. : 202041044259  
फाइल करने की तारीख / Date of Filing : 12/10/2020  
पेटेंटी / Patentee : HINDUSTHAN COLLEGE OF ENGINEERING AND  
TECHNOLOGY

प्रमाणित किया जाता है कि पेटेंटी को, उपरोक्त आवेदन में यथाप्रकटित POLYESTER RESIN LOADED NANOCOMPOSITE MATERIAL FOR CARBON DIOXIDE SEQUESTRATION AND THE METHOD OF PREPARATION THEREOF नामक आविष्कार के लिए, पेटेंट अधिनियम, 1970 के उपबंधों के अनुसार आज तारीख अक्टूबर 2020 के बारहवें दिन से बीस वर्ष की अवधि के लिए पेटेंट अनुदत्त किया गया है।

It is hereby certified that a patent has been granted to the patentee for an invention entitled POLYESTER RESIN LOADED NANOCOMPOSITE MATERIAL FOR CARBON DIOXIDE SEQUESTRATION AND THE METHOD OF PREPARATION THEREOF as disclosed in the above mentioned application for the term of 20 years from the 12<sup>th</sup> day of October 2020 in accordance with the provisions of the Patents Act, 1970.



अनुदान की तारीख : 08/06/2022  
Date of Grant :

पेटेंट नियंत्रक  
Controller of Patent

**टिप्पणी** - इस पेटेंट के नवीकरण के लिए फीस, यदि इसे बनाए रखा जाना है, अक्टूबर 2022 के बारहवें दिन को और उसके पश्चात प्रत्येक वर्ष में उसी दिन देय होगी।

**Note.** - The fees for renewal of this patent, if it is to be maintained will fall / has fallen due on 12<sup>th</sup> day of October 2022 and on the same day in every year thereafter.



# REPORT ON PATENT-PUBLISHED

APPLICATION NO. 202041044700

DATE OF FILING: 14/10/2020

## TITLE OF THE INVENTION

“PRODUCTION OF BIODEGRADABLE  
PLASTIC FROM ORGANIC FLOUR  
AND THE METHOD OF PREPARATION  
THEREOF”

## NAME OF INVENTOR(S):

S. KAVITHA  
M.SEENUVASAN  
K.SATHISH KUMAR  
K.SWATHI  
S.DILLWYN



DEPARTMENT OF CHEMICAL ENGINEERING

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# FIELD OF THE INVENTION

The present invention generally relates to the field of biodegradable plastic, in particular relates to a synthesis of biodegradable plastic from organic flour such as wheat flour and white flour to be used as a packaging material and container.

# OBJECTIVE OF THE INVENTION

- The main object of the present invention is to develop a biodegradable plastic.
- It is yet another object of the present invention to use wheat flour and maida for the synthesis of biodegradable plastic.
- It is even another object of the present invention to utilize the biodegradable plastic as packaging material and container.

# IMPACT ON SOCIETY

Bioplastics do produce significantly fewer greenhouse gas emissions than traditional plastics over their lifetime. There is no net increase in carbon dioxide when they break down because the plants that bioplastics are made from absorbed that same amount of carbon dioxide as they grew. Bio-plastics that might in the future be produced with renewable energy showed the most promise for substantially reducing greenhouse gas emissions. The need for affordable, environmentally friendly products lessens the problems with waste management and pollution. The major four reasons bio-plastics benefit the environment are,

- **Conserve Non-Renewable Resource:** Biodegradable plastics help conserve petroleum supplies. Traditional plastics come from heating and treating oil molecules until they turn into polymers. Bioplastics come from natural sources including crops like corn and switch grass. This makes them conserve non-renewable sources of energy such as petroleum.
- **Reduce CO<sub>2</sub> Emission:** One of the main advantages of using biodegradable plastic is a significant reduction in carbon emissions during the manufacturing process. Furthermore, since the materials used to create biodegradable plastics are plant-based, minimal carbon is emitted during the composting process.
- **Low Energy Consumption:** The manufacturing process of biodegradable plastics requires fewer amounts of energy. Also, they do not need fossil fuels to be recycled. Since the energy requirement is less, the pollution and environmental impact are significantly reduced.
- **Eco-Friendly Solution:** Biodegradable plastics require composting or recycling to ensure proper breakdown of the plastic pieces. The requirement to properly dispose of biodegradable plastic products automatically reduces the amount of waste. This waste would otherwise be sent to landfills in order to discard them. Moreover, the land areas can be used for agriculture, residence or industrial applications instead of converting them to landfills.

(12) PATENT APPLICATION PUBLICATION

(21) Application No.202041044700 A

(19) INDIA

(22) Date of filing of Application :14/10/2020

(43) Publication Date : 30/10/2020

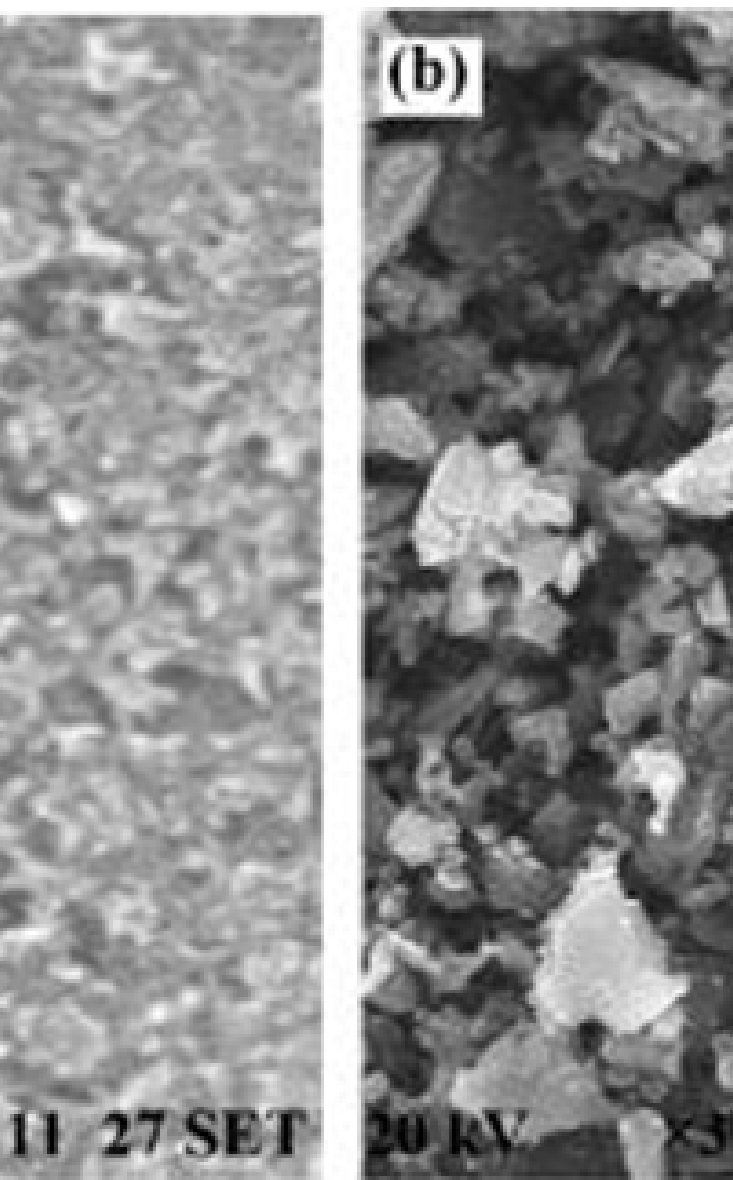
(54) Title of the invention : PRODUCTION OF BIODEGRADABLE PLASTIC FROM ORGANIC FLOUR AND THE METHOD OF PREPARATION THEREOF

(51) International classification	:C08J 11/16	(71)Name of Applicant : <b>1)S. KAVITHA</b>
(31) Priority Document No	:NA	Address of Applicant :12, P N NAGAR, KUNIAMUTHUR,
(32) Priority Date	:NA	COIMBATORE, TAMIL NADU, INDIA-641008. Tamil Nadu
(33) Name of priority country	:NA	India
(86) International Application No	:NA	(72)Name of Inventor :
Filing Date	:NA	<b>1)S. KAVITHA</b>
(87) International Publication No	: NA	<b>2)M.SEENUVASAN</b>
(61) Patent of Addition to Application Number	:NA	<b>3)K.SATHISH KUMAR</b>
Filing Date	:NA	<b>4)K.SWATHI</b>
(62) Divisional to Application Number	:NA	<b>5)S.DILLWYN</b>
Filing Date	:NA	

(57) Abstract :

ABSTRACT OF THE INVENTION Title: Production of biodegradable plastic from organic flour and the method of preparation thereof This invention discloses the composition to prepare biodegradable plastic comprising organic flour, polymer and plasticizer. To prepare the biodegradable plastic, organic flour, polymer and plasticizer in the ratio 1:0.6:0.2 are mixed together with water base. It is further mixed with a mechanical stirrer and heated to induce polymerization reaction. The collected semisolid form is casted as a film and dried in a suitable mold to get the desired shape. The present invention produces a biodegradable plastic that can be used as a packaging material and container.

No. of Pages : 16 No. of Claims : 10



# REPORT ON PATENT -PUBLISHED



## TITLE OF THE INVENTION

“MAGNETITE EMBEDDED BIOCHAR AS NANO-SORBENT FOR EFFECTIVE ADSORPTION OF TEXTILE DYE AND THE METHOD THEROF”

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**APPLICATION NUMBER:**

**202241028399**

**DATE OF FILING:**

**17/05/2022**



# FIELD OF THE INVENTION

The present invention relates to the field of biochar as nanosorbent. More specifically it relates to the preparation of magnetite embedded biochar as nano-sorbent for effective adsorption of textile dye.

# OBJECTIVE OF THE INVENTION

- The main objective of our system is to prepare a magnetite embedded biochar as nano-sorbent for effective adsorption of textile dye.
- The second objective of the invention is a biochar raw materials are natural, environment-friendly, and present in a natural environment.
- Further objective of the present invention is the nano-sorbent was synthesized by the embedment of magnetite onto the biochar obtained from “Cassia auriculata” for the effective adsorption of Levafix blue (LB) dye.

# IMPACT ON SOCIETY

Wastewater released from various chemical industries contains dyes. They are directly released into natural water bodies. That results life-threatening health damages (for example mutagenesis and carcinogenicity) through food chains and environmental worsening.

The process of absorption using this bio-char can impact the society in many ways, such as;

- **Bio-char Impact:** Biochar is produced when plant matter (leaves, trunks, roots), manure, or other organic material is heated in a zero- or low-oxygen environment. The carbon the organic material had previously absorbed via photosynthesis is thus captured in solid form; the resulting biochar can take the shape of sticks, pellets, or dust.
- **Environmental Friendly Technique:** It improves the quality of the arable land. It is a carbon sink that binds CO<sub>2</sub> captured from the atmosphere for a long time. For example, CO<sub>2</sub> captured by a tree becomes biochar once felled.
- **Cost Effective:** It is relatively cost-effective to produce and use. It uses resources that would otherwise be wasted, such as wood from felled trees, garden waste and food waste.

(54) Title of the invention : MAGNETITE EMBEDDED BIOCHAR AS NANO-SORBENT FOR EFFECTIVE ADSORPTION OF TEXTILE DYE AND THE METHOD THEROF

<p>(51) International classification :C02F0001280000, C10B0053020000, B01J0020200000, G16C0020100000, C05D0009000000</p> <p>(86) International Application No Filing Date :PCT// :01/01/1900</p> <p>(87) International Publication No : NA</p> <p>(61) Patent of Addition to Application Number Filing Date :NA :NA :NA</p> <p>(62) Divisional to Application Number Filing Date :NA :NA :NA</p>	<p>(71)Name of Applicant :  <b>1)Hindusthan College of Engineering and Technology</b>  Address of Applicant :The Principal Hindusthan College of Engineering and Technology, Valley Campus, Pollachi Highway, Coimbatore, Tamilnadu, India – 641 032. Mobile No: +91-99620 82276 E-mail: msvasan.chem@gmail.com -----</p> <p><b>Name of Applicant : NA</b>  <b>Address of Applicant : NA</b></p> <p>(72)Name of Inventor :  <b>1)Dr Seenuvasan M</b>  Address of Applicant :55, Press Enclave, Kovaipudur, Coimbatore, Tamilnadu, India – 641042 -----</p> <p><b>2)Dr Magudeswaran N</b>  Address of Applicant :90/20 Perumal Nagar, Kovaipudur, Coimbatore, Tamilnadu, India - 641042 -----</p> <p><b>3)Dr Jaya J</b>  Address of Applicant :Professor, Department of Electronics and Communication Engineering, Hindusthan College of Engineering and Technology, Coimbatore, Tamilnadu, India – 641 032 -----</p> <p><b>4)Mr Dineshkumar M</b>  Address of Applicant :191A, Giri Amman Koil Street, Peelamedu, Coimbatore, Tamilnadu, India – 641 004 -----</p> <p><b>5)Mr Rajkumar A</b>  Address of Applicant :297, Perumal Kovil Street, Papparam Bakkam, Tiruvallur, Tamilnadu, India - 602025. -----</p> <p><b>6)Ms Induja P</b>  Address of Applicant :11/62a, 5a, VOC nagar, 7th street, sirumugai, Coimbatore, Tamilnadu, India - 641 302 -----</p> <p><b>7)Dr Nithyanandam C</b>  Address of Applicant :LIG-183, TNHB I-IV Block, Ganapathy Maanagar, Coimbatore, Tamilnadu, India – 641006. -----</p> <p><b>8)Dr Senthil Murugan V</b>  Address of Applicant :Associate Professor, Department of Mechanical Engineering, Hindusthan College of Engineering and Technology, Coimbatore, Tamilnadu, India – 641 032 -----</p> <p><b>9)Mr Sriharish K</b>  Address of Applicant :Assistant Professor, Department of Mechanical Engineering, Hindusthan College of Engineering and Technology, Coimbatore, Tamilnadu, India – 641 032 -----</p>
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(57) Abstract :

MAGNETITE EMBEDDED BIOCHAR AS NANO-SORBENT FOR EFFECTIVE ADSORPTION OF TEXTILE DYE AND THE METHOD THEROF ABSTRACT The present invention discloses a process of magnetite embedded biochar as nano-sorbent for effective adsorption of textile dye. The nano-sorbent was synthesized by the embedment of magnetite onto the biochar obtained from Cassia auriculata for the effective adsorption of Levafix blue (LB) dye. A different instrumental technique revealed the properties of biochar and the nano-sorbent. The effect of contact time, initial dye concentration and nano-sorbent dosage on the removal of LB dye was examined. Also, out of the kinetics studies models, the best fit and highest R2 values showed that the adsorption followed pseudo-second-order kinetics. Langmuir, Freundlich and Temkin isotherm models were established for the adsorption equilibrium data and the Temkin model showed the best reliability with the experimental results with highest R2 value of 0.9915. The adsorption system was modeled using the Artificial Neural Net-work (ANN) for bio char and nano-sorbent.

No. of Pages : 29 No. of Claims : 9

# REPORT ON INTERNATIONAL PATENT -GRANTED



## TITLE OF THE INVENTION

"MEDICATION DOSE PREPARATION AND TRANSFER SYSTEM  
USING ARTIFICIAL INTELLIGENCE MECHANISM"

NAME OF INVENTOR(S):

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CHANDRAKUMAR DIXIT  
SUSHMA JAISWAL  
SEENUVASAN M  
MANISH RANJAN PANDEY  
ARAVIND KUMAR SHUKLA  
RAJDEEP SINGH  
RAVICHANDRAN SIVARAMAKRISHNAN  
ARPAN KUMAR TRIPATHI

**APPLICATION NUMBER:**

**20 2022 100 927.9**

**PUBLISHED ON: 18.02.2022**

**GRANTED DATE: 02.06.2022**



# BACKGROUND OF THE INVENTION

*There are a number of patient clinical settings including in-hospital, outpatient and emergency medical services that require transfer of medications from original pharmaceutical manufacturer's primary containers to secondary containers to facilitate caregiver administration to patients. When medications are transferred to secondary containers it is standard clinical best practice to label them to reduce the potential for medication errors. However, due to dose measurement mistakes, incorrect transfer of labeling information and other factors, errors continue to occur when caregivers transfer medications from primary containers (vials to syringes) or prepare partial doses (empty syringe withdraws of a partial amount from a primary vial). Typically, the dosage preparation is different form like solid, semisolid, liquid, Gaseous, oral, sublingual, Topical, ophthalmic, Ear drops, Parenteral, Nasal, Rectal, Vaginal. The each dosage form of processing is working under the mixing of chemical or nature compounds. The every one components are mixing first stage to last stage for the artificially given of coding instruction the amount (kg) of chemical compound or nature compound to the machine which is also followed to Speed of mixing and time of mixing. Therefore, it confers the need and importance of this invention aims to prepare and transfer the medication dose at specified condition without any mistakes using the artificial intelligence (AI) mechanism. Thus, it is desired to address the above-mentioned disadvantages or other shortcomings or at least provide a useful alternative.*

## OUTCOME/ IMPACT ON SOCIETY

- The present invention generally relates to artificial intelligence (AI) mechanism which is help to medication dose preparation and transferring to specified condition and more specifically to medication dose preparation and transfer system for identifying medication within a medication container.*
- Measuring an amount of medication withdrawn from the medication container and transferred to a secondary container (e.g. syringe).*
- Tracking the amount of medication actually administered to a patient and tracking the amount of any residual medication disposed of as waste, using artificial intelligence (AI) mechanism.*
- Technology improvement in medical sectors leads to the more quality of treatment and accuracy.*

# Urkunde

über die Eintragung des  
Gebrauchsmusters Nr. 20 2022 100 927

**Bezeichnung:**

System zur Vorbereitung und Übertragung von Medikamentendosen mit künstlicher Intelligenz

**IPC:**

G16H 20/10

**Inhaber/Inhaberin:**

Ahmad, Nabeel, Kanpur, UP, IN  
Alaskar, Kamal, Kolhapur, Maharashtra, IN  
Dixit, Chandra Kumar, Lucknow, UP, IN  
Jaiswal, Sushma, Indore, Madhya Pradesh, IN  
Muthulingam, Seenuvasan, Coimbatore, Tamil Nadu, IN  
Pandey, Manish Ranjan, Moradabad, UP, IN  
Shukla, Arvind Kumar, Sultanpur, U.P, IN  
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Tripathi, Arpan Kumar, Durg, Chhattisgarh, IN

**Tag der Anmeldung:**

18.02.2022

**Tag der Eintragung:**

02.06.2022

Die Präsidentin des Deutschen Patent- und Markenamts



Cornelia Rudloff-Schäffer

München, 02.06.2022



# REPORT ON PATENT -PUBLISHED



## TITLE OF THE INVENTION

“A SUSTAINABLE APPROACHED TOY VENDING MACHINE  
CONVERTING WASTE PLASTICS”

NAME OF INVENTOR(S):

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MR. S NAGUL DEV  
MR. J SATHISH  
DR.M SEENUVASAN  
MR. S. RAGULASANGEERTHIAN  
MR. M. J. IHLAS AHAMED  
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MS. B. CHARUBALA

**APPLICATION NUMBER:**

**202241072493**

**DATE OF FILING:**

**15/12/2022**



# FIELD OF THE INVENTION

*The inventions studies on a machine used for conversion of waste plastics to toys for children's. It can collect waste plastics in public places like bus stops and railway stations and mould it to required shape of toy by a toy vending machine.*

# OBJECTIVE OF THE INVENTION

- *To design a toy vending machine.*
- *To study the people population usage of this machine at public places.*
- *To mould waste plastics to playful toys for kids.*
- *To check the performance of the machine and reuse the plastics frequently.*

# IMPACT ON SOCIETY

- **Plastic Reuse:** *High levels of plastic pollution often cause harmful environmental consequences. To curb the level of plastic pollution, the toy vending machine collects desired amount of plastic and immediately recycles it through a series of operations and caters it in the form a miniature toys.*
- **Easy Moulding:** *Usage of low cost equipments, low energy, low heat consumptions for moulding.*
- **Environmental Applications:** *Reduces plastic disposal at public places, Cleanliness. Conversion of plastics that are harmful to the humans.*
- **Benefits:** *Swachh Bharat (India), Reduce plastic accumulation, Reduces exploration of microplastics to the environmental, waste to wealth.*

(12) PATENT APPLICATION PUBLICATION

(21) Application No.202241072493 A

(19) INDIA

(22) Date of filing of Application :15/12/2022

(43) Publication Date : 30/12/2022

(54) Title of the invention : A SUSTAINABLE APPROACHED TOY VENDING MACHINE CONVERTING WASTE PLASTICS

(51) International classification :B29B0017020000, B29B0017000000, B29B0017040000,  
A63H0017260000, E02D0031000000  
(86) International Application No :NA  
Filing Date :NA  
(87) International Publication No : NA  
(61) Patent of Addition to :NA  
Application Number :NA  
Filing Date :NA  
(62) Divisional to Application :NA  
Number :NA  
Filing Date :NA

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(57) Abstract :

ABSTRACT High levels of plastic pollution often cause harmful environmental consequences. To curb the level of plastic pollution, the toy vending machine collects desired amount of plastic and immediately recycles it through a series of operations and caters it in the form a miniature toys. The plastic enters the machine at the collection site and it is transported through a conveyor belt to shredding compartment. This transportation involves cleansing of plastic waste with rolling drum and further cleansing of water to get rid of dust and dirt particles settling. The shredded plastic pieces are melted and moulded inside injection moulding compartment (at a temperature<300 degree Celsius) to obtain desired toy (say car).In addition to that plastic filament is used to facilitate toy vending process. The entire process is monitored through TC (integrated circuit) and for every stage of toy vending process sensors are placed to aid the function of each compartment. The moulding compartment is guarded with aluminum foil bubble sheet to prevent leakage of heat. Once the moulding takes place, the moulded piece is taken into cooling compartment and temperature is reduced using cold water circulation. The toy is delivered to the user:after that. The presence of 20 moulds and its preset models are the key functions of this machine. It simply recycles plastic to playable toy from plastic waste.

No. of Pages : 14 No. of Claims : 1

# REPORT ON PATENT-PUBLISHED

APPLICATION NO. 202241045857

DATE OF FILING: 11/08/2022

## TITLE OF THE INVENTION

**“A NEW TECHNIQUE FOR SOLID DUST REMOVAL USING TWO INLET CYCLONE SEPARATOR”**

## NAME OF INVENTOR(S):

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DR.S.SAHAYA AROCKIA SELVI

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DR.S.VIJAYALAKSHMI

DR. P. MARIMUTHU

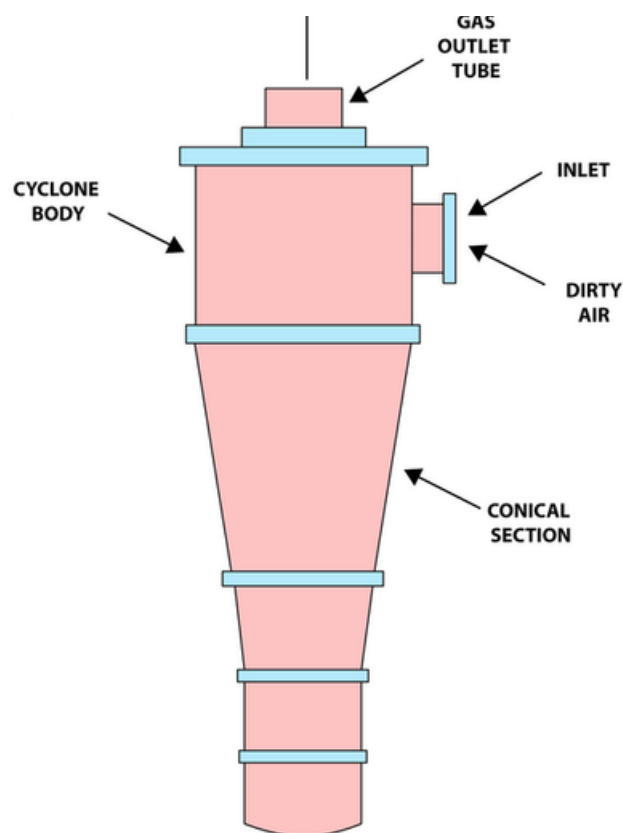
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# ***FIELD OF THE INVENTION***

*This invention is used for dust removal in various chemical Engineering applications. In contrast to the conventional design, this design is efficient, cost effective and advantageous.*

## ***OBJECTIVE OF THE INVENTION***

- To design a cyclone separator having two inlets*
- To study the effectiveness of the cyclone separator's particle collection*
- To determine particle-to-air ratio (particle concentration), the gas flow rate ratio between the two inlets, and the individual gas flow rates in each of the inlets as the parameters.*
- To check the performance of the suggested cyclone separator was seen after conducting testing.*

## ***IMPACT ON SOCIETY***

- **Simple Technique:** The two inlet cyclone separator reveals that the dust is easily removed, centrifugal force is increased, particle collection efficiency becomes eventually quicker and so the time taken for the entire process is reduced as compare to the conventional one.*
- **Environmental Applications:** The cyclone separator is a device for separating solid particles from contaminated gas streams, and has long been used in industrial applications such as power generations, gas turbines, chemical processes and so forth.*
- **Benefits:** Reduces energy consumption, high efficiency separation, micro level particles separation.*

(54) Title of the invention : A NEW TECHNIQUE FOR SOLID DUST REMOVAL USING TWO INLET CYCLONE SEPARATOR

(51) International classification :B01D0045160000, B04C0009000000, B01D0045120000, B04C0005081000, B04C0005280000

(86) International Application No :NA  
 Filing Date :NA

(87) International Publication No : NA

(61) Patent of Addition to Application Number :NA  
 Filing Date :NA

(62) Divisional to Application Number :NA  
 Filing Date :NA

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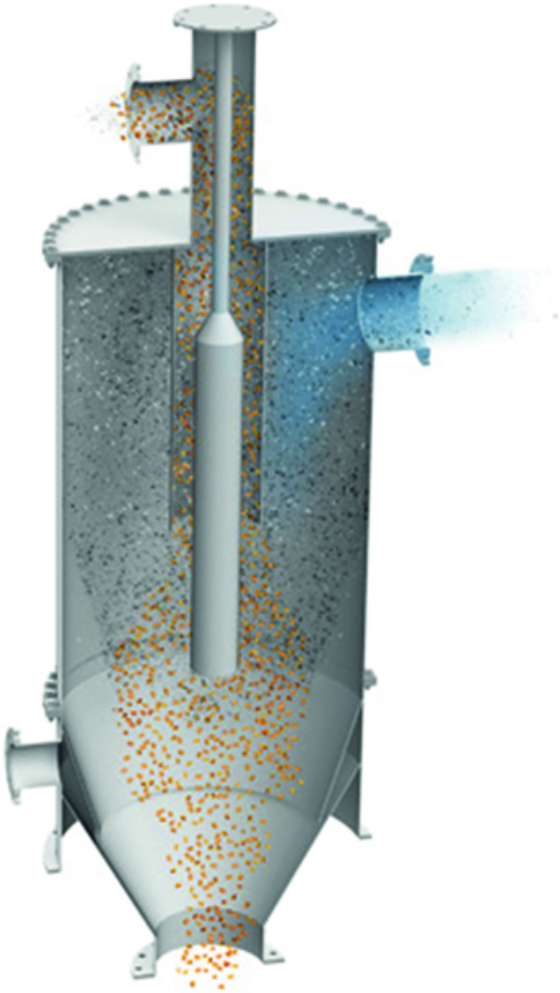
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(57) Abstract :  
 Cyclone separator is the device used Tor dust removal. In contrast to the conventional design,' which only has one feed intake, the cyclone separator in this study has two inlets. The effectiveness of the cyclone separator's particle collection was examined in relation to the inclusion of a secondary intake. By giving the cyclone separator twin inlets, the centrifugal force acting on the particles was changed, changing the effectiveness of particle collection. It was created as a cyclone separator with two inlets. Its performance was examined by experiments using the particle-to-air ratio (particle concentration), the gas flow rate ratio between the two inlets, and the individual gas flow rates in each of the inlets as the parameters. The real performance of the suggested cyclone separator was seen after conducting testing, and it differed in how well it performed in collecting the particles from a gas-solid combination. The entrance gas velocity, collecting efficiency, airflow measurements, and flow rate of air were calculated to investigate the operation of a cyclone separator. The two inlet cyclone separator reveals that the dust is easily removed, centrifugal force is increased, particle collection efficiency becomes eventually quicker and so the time taken for the entire process is reduced.

No. of Pages : 14 No. of Claims : 1

# REPORT ON PATENT -PUBLISHED



## TITLE OF THE INVENTION

“A NEW AIR ELUTRIATOR COUPLED WITH CERAMIC FILTER MEMBRANE FOR SEPARATION OF SOLID PARTICLES FROM GAS MIXTURE”

NAME OF INVENTOR(S):

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MR. M. R. SHARMAN MAL SAM BENNET

MS. B. MONISHADEVI

**APPLICATION NUMBER:**

**202341000232**

**DATE OF FILING:**

**03/01/2023**

# FIELD OF THE INVENTION

This current inventions is used for dust removal in various chemical Engineering applications. In contrast to the conventional design, this design is efficient, cost effective and adavantegous.

# OBJECTIVE OF THE INVENTION

- To design a air elutriator adding a ceramic membrane as a novel technique
- To design two inlet feed for optimization
- To examine the performance on a gas solid mixture
- To design a ceramic filter membrane to fit into the air elutriator

# IMPACT ON SOCIETY

Air Elutriator is the device used for separating particles smaller than 1 pm from solid gas mixture. In the present system, Elutriator has only one feed intake without membrane for removing smaller particles. There are some drawbacks in the present system for maximum removal of the smaller particles which are available in the atmosphere. It will affect the health of the peoples those who are working in the particular place. Therefore, the major outcomes from the study are,

- **Reduce of Air Pollution:** Development of the air elutriator will reduce the particulate matter in the atmospheric environment into very low levels.
- **Simple Technique and Cost Effective:** Dual inlet Air Elutriator results in increasing of the centrifugal force which eventually results in increases particle collection efficiency with maximum quality due to presence filter membrane.

(12) PATENT APPLICATION PUBLICATION

(21) Application No.202341000232 A

(19) INDIA

(22) Date of filing of Application :03/01/2023

(43) Publication Date : 27/01/2023

(54) Title of the invention : A NEW AIR ELUTRIATOR COUPLED WITH CERAMIC FILTER MEMBRANE FOR SEPARATION OF SOLID PARTICLES FROM GAS MIXTURE

<p>(51) International classification :C12M0001000000, G01N0001220000, B04B0005040000, C02F0003120000, B01D0061080000</p> <p>(86) International Application No :NA Filing Date :NA</p> <p>(87) International Publication No : NA</p> <p>(61) Patent of Addition to Application Number :NA Filing Date :NA</p> <p>(62) Divisional to Application Number :NA Filing Date :NA</p>	<p>(71)Name of Applicant :  <b>1)Mr. J. SATHISH</b>  Address of Applicant :ASSISTANT PROFESSOR, DEPARTMENT OF CHEMICAL ENGINEERING , HINDUSTHAN COLLEGE OF ENGINEERING &amp; TECHNOLOGY, MALUMICHAMPATTI, COIMBATORE DISTRICT, TAMIL NADU, INDIA, 641032. -----</p> <p><b>2)Mr. S. NAGUL DEV</b>  <b>3)Dr. M. S. VIVEK</b>  <b>4)Dr. M. SEENUVASAN</b>  <b>5)Mr. M. R. NOVA JAYAMAL SOORIAA</b>  <b>6)Mr. M. S. CHANDIRASEKAR</b>  <b>7)Mr. B. BHUVANESHWARAN</b>  <b>8)Mr. P. NITHISH KUMAR</b>  <b>9)Mr. M. R. SHARMAN MAL SAM BENNET</b>  <b>10)Ms. B. MONISHADEVI</b></p> <p>Name of Applicant : NA  Address of Applicant : NA</p> <p>(72)Name of Inventor :  <b>1)Mr. J. SATHISH</b>  Address of Applicant :ASSISTANT PROFESSOR, DEPARTMENT OF CHEMICAL ENGINEERING , HINDUSTHAN COLLEGE OF ENGINEERING &amp; TECHNOLOGY, MALUMICHAMPATTI, COIMBATORE DISTRICT, TAMIL NADU, INDIA, 641032. -----</p> <p><b>2)Mr. S. NAGUL DEV</b>  Address of Applicant :ASSISTANT PROFESSOR, DEPARTMENT OF CHEMICAL ENGINEERING , HINDUSTHAN COLLEGE OF ENGINEERING &amp; TECHNOLOGY, MALUMICHAMPATTI, COIMBATORE DISTRICT, TAMIL NADU, INDIA, 641032. -----</p> <p><b>3)Dr. M. S. VIVEK</b>  Address of Applicant :ASSISTANT PROFESSOR, DEPARTMENT OF CHEMICAL ENGINEERING , HINDUSTHAN COLLEGE OF ENGINEERING &amp; TECHNOLOGY, MALUMICHAMPATTI, COIMBATORE DISTRICT, TAMIL NADU, INDIA, 641032. -----</p> <p><b>4)Dr. M. SEENUVASAN</b>  Address of Applicant :PROFESSOR, DEPARTMENT OF CHEMICAL ENGINEERING , HINDUSTHAN COLLEGE OF ENGINEERING &amp; TECHNOLOGY, MALUMICHAMPATTI, COIMBATORE DISTRICT, TAMIL NADU, INDIA, 641032. -----</p> <p><b>5)Mr. M. R. NOVA JAYAMAL SOORIAA</b>  Address of Applicant :UG SCHOLAR, DEPARTMENT OF CHEMICAL ENGINEERING , HINDUSTHAN COLLEGE OF ENGINEERING &amp; TECHNOLOGY, MALUMICHAMPATTI, COIMBATORE DISTRICT, TAMIL NADU, INDIA, 641032. -----</p> <p><b>6)Mr. M. S. CHANDIRASEKAR</b>  Address of Applicant :UG SCHOLAR, DEPARTMENT OF CHEMICAL ENGINEERING , HINDUSTHAN COLLEGE OF ENGINEERING &amp; TECHNOLOGY, MALUMICHAMPATTI, COIMBATORE DISTRICT, TAMIL NADU, INDIA, 641032. -----</p> <p><b>7)Mr. B. BHUVANESHWARAN</b>  Address of Applicant :UG SCHOLAR, DEPARTMENT OF CHEMICAL ENGINEERING , HINDUSTHAN COLLEGE OF ENGINEERING &amp; TECHNOLOGY, MALUMICHAMPATTI, COIMBATORE DISTRICT, TAMIL NADU, INDIA, 641032. -----</p> <p><b>8)Mr. P. NITHISH KUMAR</b>  Address of Applicant :UG SCHOLAR, DEPARTMENT OF CHEMICAL ENGINEERING , HINDUSTHAN COLLEGE OF ENGINEERING &amp; TECHNOLOGY, MALUMICHAMPATTI, COIMBATORE DISTRICT, TAMIL NADU, INDIA, 641032. -----</p> <p><b>9)Mr. M. R. SHARMAN MAL SAM BENNET</b>  Address of Applicant :TRANINEE ENGINEER, OPERATION, INOX AIR PRODUCTS, SIPCOT PHASE II, INDUSTRIAL COMPLEX, MORANAPALLI, HOSUR, TAMIL NADU, INDIA, 635109. -----</p> <p><b>10)Ms. B. MONISHADEVI</b>  Address of Applicant :ENVIRONMENTAL ENGINEER, ENVIRONMENT, EHS360 LABS PRIVATE LIMITED, 10/2, GROUND FLOOR, 50TH STREET, 7TH AVENUE, ASHOK NAGAR, CHENNAI, TAMIL NADU, INDIA, 600083. -----</p>
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(57) Abstract :

An Air Elutriator is the device used for separating particles smaller than 1 pm from solid gas mixture. In the present system, Elutriator has only one feed intake without membrane for removing smaller particles. There are some drawbacks in the present system for maximum removal of the smaller particles which are available in the atmosphere. It will affect the health of the peoples those who are working in the particular place. In order to avoid health issue, a new device is developed for removing maximum amount of small particles in the atmosphere. This device consists of dual feed inlets coupled with ceramic filter membrane. The performance of the new developed Elutriator was examined by performing a test on gas-solid mixture. The secondary feed intake of the air Elutriator is more effective, and experiences a change in centrifugal force acting on the particle. Here the change in centrifugal force would be more effective in the particle collection. The influent gas velocity, the efficiency of collecting particle and flow rate of air were calculated to explore the operation of the Air Elutriator. The dual inlet Air Elutriator results in increasing of the centrifugal force which eventually results in increases particle collection efficiency with maximum quality due to presence filter membrane.

No. of Pages : 14 No. of Claims : 1





# REPORT ON PATENT -PUBLISHED



## TITLE OF THE INVENTION

“CHEMICAL COMPOSITION AND BIOLOGICAL ACTIVITY OF  
VANILLA PALMARUM AND LIPPIAALBA”

NAME OF INVENTOR(S):

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DR. R. GOKULAN

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MR. R. G. PADMANABHAN

DR. G. BASKAR

MR. P. RAM KUMAR

**APPLICATION NUMBER:**

**202241054127**

**DATE OF FILING:**

**21/09/2022**

## FIELD OF THE INVENTION

This invention is to the field of analysing the importance of *Vanilla palmarum* and *Lippia alba* plant for its importance in medicinal purpose.

## OBJECTIVE OF THE INVENTION

- To analyze the chemical composition, antioxidant activity and antidermatophytic activity of the crude extracts of *V. palmarum*, as well as the chemical composition and antidermatophytic activity of the essential oil of *L. Alba*.
- The dermatophytes used were *Trichophyton mentagrophytes*, *Trichophyton rubrum* and *Microsporum gypseum*. Inhibition of mycelial growth of all fungi was evaluated and minimum inhibitory and minimum fungicidal concentrations of extracts and oil were determined.
- The antioxidant activity of the extracts was evaluated by free radical scavenging methods.

## IMPACT ON SOCIETY

The findings are used for the purpose of;

- **Medicinal Purpose:** *Vanilla palmarum* and *Lippia alba* are plants that can be found in the semiarid region of Bahia, therefore, a huge volume are used for medicinal purposes by local populations in different ways.
- **Scavenging for Various Applications:** Antioxidants derived from plants provide protection to cell by scavenging free oxygen radical through offsetting ROS. This has been made possible due to the presence of certain bioactive substances, such as phenolic compounds, flavonoids, and essential oils, rendering plants with antioxidant activity.

(54) Title of the invention : Chemical Composition and Biological activity of Vanilla palmarum and Lippiaalba

<p>(51) International classification :A61K0008920000, A61K0009700000, H01J0049040000, C12P0021020000, A61Q0017000000</p> <p>(86) International Application No :PCT// Filing Date :01/01/1900</p> <p>(87) International Publication No : NA</p> <p>(61) Patent of Addition to Application Number :NA Filing Date :NA</p> <p>(62) Divisional to Application Number :NA Filing Date :NA</p>	<p>(71)Name of Applicant :  <b>1)Prof. Dr. K. Muthuchelian</b>  Address of Applicant :Advisor, St. Peter's Group of Institutions &amp; Adiyamaan Group of Institutions, Chennai and Hosur Chennai -----</p> <p><b>2)Dr. S. Alwin David</b>  <b>3)Dr. K. Gayathri</b>  <b>4)Mr. S. Nagul Dev</b>  <b>5)Dr. S. Mohamed Rabeek</b>  <b>6)Dr. R. Gokulan</b>  <b>7)Divya S</b>  <b>8)Mr. R. G. Padmanabhan</b>  <b>9)Dr. G. Baskar</b>  <b>10)Mr. P. Ram Kumar</b>  Name of Applicant : NA  Address of Applicant : NA</p> <p>(72)Name of Inventor :  <b>1)Prof. Dr. K. Muthuchelian</b>  Address of Applicant :Advisor, St. Peter's Group of Institutions &amp; Adiyamaan Group of Institutions, Chennai and Hosur Chennai -----</p> <p><b>2)Dr. S. Alwin David</b>  Address of Applicant :Assistant Professor, PG and Research Department of Chemistry, V.O.Chidambaram College, Thoothukudi – 628008, Tamil Nadu, India Thoothukudi -----</p> <p><b>3)Dr. K. Gayathri</b>  Address of Applicant :Assistant Professor, Department of Physics, Amet Deemed to Be University ECR, Kanathur, Chennai – 603112. Chennai -----</p> <p><b>4)Mr. S. Nagul Dev</b>  Address of Applicant :Assistant Professor, Department of Chemical Engineering, Hindusthan College of Engineering and Technology, Coimbatore-32 Coimbatore -----</p> <p><b>5)Dr. S. Mohamed Rabeek</b>  Address of Applicant :Assistant Professor, PG and Research Department of Chemistry, Jamal Mohamed College (Autonomous), Tiruchirappalli – 620 020 Tiruchirappalli -----</p> <p><b>6)Dr. R. Gokulan</b>  Address of Applicant :Assistant Professor, Department of Civil Engineering, GMR Institute of Technology, Rajam – 532 127 Rajam -----</p> <p><b>7)Divya S</b>  Address of Applicant :Department of Textiles and Apparel Design, Bharathiar University, Maruthamalai Road, Coimbatore-641 046, Tamil Nadu, India Coimbatore -----</p> <p><b>8)Mr. R. G. Padmanabhan</b>  Address of Applicant :Assistant Professor, Department of Automobile Engineering, Arasu Engineering College, Kumbakonam Kumbakonam -----</p> <p><b>9)Dr. G. Baskar</b>  Address of Applicant :Professor, Department of Biotechnology, St. Joseph's College of Engineering, Chennai – 600119 Chennai -----</p> <p><b>10)Mr. P. Ram Kumar</b>  Address of Applicant :Assistant Professor, PG and Research Department of Chemistry, V.O.Chidambaram College, Thoothukudi – 628008, Tamil Nadu, India Thoothukudi -----</p>
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## (57) Abstract :

[014] Vanilla palmarum and Lippia alba are plants that can be found in the semi-arid region of Bahia. Both are used for medicinal purposes by local populations in different ways. However, V. palmarum is not studied much in several aspects, such as its chemical composition and the biological activities it performs. L. alba, in turn, is one of the most studied plant species, but, due to its geographic variability, the chemical composition of its essential oil is quite variable. Therefore, the objective of this work was to analyze the chemical composition, antioxidant activity and antidermatophytic activity of the crude extracts of V. palmarum, as well as the chemical composition and antidermatophytic activity of the essential oil of L. alba. The dermatophytes used were Trichophyton mentagrophytes, Trichophyton rubrum and Microsporum gypseum. Inhibition of mycelial growth of all fungi was evaluated and minimum inhibitory and minimum fungicidal concentrations of extracts and oil were determined. The antioxidant activity of the extracts was evaluated by free radical scavenging methods. The extracts of V. palmarum showed antioxidant activity. Both extracts and essential oil showed antidermatophytic activity. Carvone and limonene are the major compounds in the essential oil analyzed. Accompanied Drawing [FIG. 1] [FIG. 2][FIG. 3] [FIG. 4][FIG. 5] [FIG. 6][FIG. 7]

No. of Pages : 28 No. of Claims : 6