



A PORTABLE WATER FILTRATION DEVICE FOR REMOVING IMPURITIES FROM WATER USING CONTAMINANT-SPECIFIC PURIFICATION CARTRIDGES

IITM Technology Available for Licensing

PROBLEM STATEMENT

- Generally, Domestic water treatment and recycling systems remain largely unexplored due to the **large space requirements, high initial investment, & substantial variation in input water quality.**
- There are a few treatment method discussed herein which could not provide the suitable solutions by eradicating above issues.
- Hence, there is a need to address said issues in efficient matter.

INTELLECTUAL PROPERTY

IITM IDF Ref. 1638; IN Patent No: 373947
PCT Application No. PCT/IN2018/050895

TECHNOLOGY CATEGORY/ MARKET

Technology: Continuous-flow greywater sink;
Industry & Application: Home Appliances;
Market: The global flow chemistry market is projected to grow at a **CAGR of 12.2%** during **2024-2030.**

TRL (TECHNOLOGY READINESS LEVEL)

TRL-4, Proof of Concept ready, tested in lab.

TECHNOLOGY

- The present invention describes **water purification device** wherein the **contaminants** are removed by a multi-step **filtration process.** (Refer Fig 1a & 1b)
- The filtration process comprises several components including:
 - a) **a re-usable and washable pre-filter** for removal of suspended particulate and macroscopic impurities;
 - b) **hollow fiber and electrospun fiber membrane module** for **microfiltration** and **ultra-filtration,**

having **pore size** of **less than or equal to nanometers,** to remove microbial contamination;

- c) **a compact modular annular housing filtration unit** with **region-specific contaminant removing nanocomposite materials housing and nanomaterials** decorated activated coconut charcoal housing for biocidal activity and organic contaminant removal; and
- d) a bellow **pump unit** to develop pressure inside the feed water container reservoir.
- The contaminants are removed by a **multi-step filtration process** encompassing particulate filtration, filtration of regional & microbial contaminants using nanomaterials and membranes, and filtration of organic materials by membrane.
- Further, the nanomaterial decorated carbon cartridge at a flow rate of equal to or greater than **200ml/min.**
- The regional contaminants are **from arsenic, iron, fluoride, uranium, lead, nickel, chromium, manganese, magnesium, cadmium, mercury and pesticides or combination** thereof in the water soluble forms.
- The Water purification device filters impurities in multiple filtration processes using contaminant-specific purification cartridges.

RESEARCH LAB

Prof. Pradeep T, Dept. of Chemistry,

CONTACT US

Dr. Dara Ajay, Head
Technology Transfer Office,
IPM Cell- IC&SR, IIT Madras

IITM TTO Website:
<https://ipm.icsr.in/ipm/>

Email: smipm-icsr@icsrpis.iitm.ac.in
sm-marketing@imail.iitm.ac.in
Phone: +91-44-2257 9756/ 9719

KEY FEATURES / VALUE PROPOSITION

❖ *Technical Perspective:*

- Facilities **portable hand-held, hand-operated and electricity-free water purification device.**
- The membrane filtration is by **hollow fiber membrane and electrospun membrane** with flowrate equal to or greater than **200 ml/min.**
- The nanomaterials **decorated carbon filter** removes organic & metal ion contaminations at a concentration of **0-0.5 ppb** with feed input of **100 ppb.**
- The **purification** occurs with the **transverse flow of water in membrane cartridge** and **reverse directional flow in annular housing.**
- Removal of multiple contaminants occurs in a sequence of **particulate removal, turbidity removal, microbial removal, regional contaminant removal & organic contaminants removal.**
- The **purifier cartridge** has an in-built **color indicator** to indicate **cartridge life** and its performance. (Refer Fig 2)
- The membrane cartridge uses **electrospun membrane cartridge or hollow fiber membrane cartridge** for microfiltration and ultrafiltration.

❖ *Industrial Perspective:*

- The device filters **output water with arsenic concentration below 10 ppb** with input concentration in the range of **10 ppb - 300 ppb.**
- The device **filters microbial contaminations** including **bacterial and viral contaminants.**
- Cost-effective** water purification device and simply applicable **home appliances & Industrial Applications.**

IMAGE

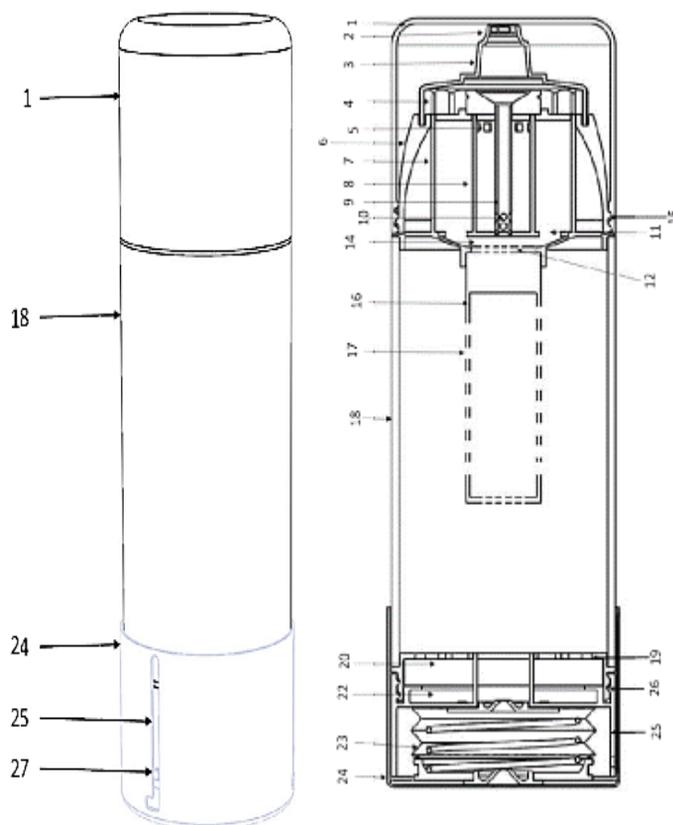


FIG.1A & 1B: Illustrate schematic & cross-sectional view of water purifying device;

RESULT



FIG.2: Illustrates the change in cartridge colour with use

CONTACT US

Dr. Dara Ajay, Head
Technology Transfer Office,
IPM Cell- IC&SR, IIT Madras

IITM TTO Website:
<https://ipm.icsr.in/ipm/>

Email: smipm-icsr@icsrpis.iitm.ac.in
sm-marketing@imail.iitm.ac.in
Phone: +91-44-2257 9756/ 9719