A COMPACT, MODULAR AND SCALABLE CONTINUOUS-FLOW GREYWATER SINK FOR POTABLE AND NON-POTABLE USES

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. 2260; IN Patent No: 462091

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)

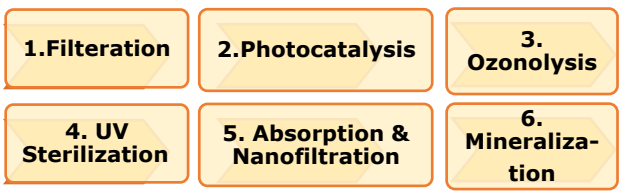
TRL-4, Proof of Concept ready, tested in lab.

RESEARCH LAB

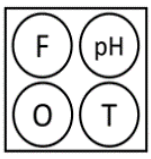
Prof. Pradeep T, Dept. of Chemistry,

TECHNOLOGY

- The present invention describes a **continuous-flow system** for **greywater treatment**.
- The system comprising an **operation units** including for the purpose of particulate **filtration, photocatalysis, ozonolysis** using **ozone nanobubbles, UV sterilization, adsorption & nanofiltration, mineralization**;
- Further said system includes a **sensing unit** consisting of **sensors**, incorporated at **several points** in the treatment pathway.
- In addition to this, said system includes a **controller unit** that receives **water quality data** from all **sensing units** & provides **response to** the **respective treatment operations.**
- Moreover, said invention describes a **continuous-flow process** for greywater treatment through a compact continuous-flow system.
- First steps explained that the influent greywater flows through the operation units for the purpose of set of process explained herein using smart chart:



- Further steps explained that the influent greywater senses via **sensing unit** incorporated at **several points** in the **treatment pathway**.
- Finally, the influent greywater controlled by a **controller unit** upon receiving water quality data from all **sensing units** & provides response to the **respective treatment operations.**
- The sensing units measure:
- **the flow rate, pH,**
- **TDS,**
- **TSS,**
- **turbidity,**
- **conductivity,**
- And the amount of **organic & inorganic matter**.



- The **water softener** is added for **reducing the hardness** of water by precipitating metal ions.

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KEY FEATURES / VALUE PROPOSITION

❖ *Technical Perspective:*

- **Compact, modular & scalable continuous-flow graywater sink for greywater treatment**;
- Said continuous flow system is attached to a **kitchen sink, bathtub, bathroom or toilet**, with specific unit operations **produce improved quality water** from grey water.
- The **organic & inorganic pollutants** are removed through **ozonolysis** using **ozone nanobubbles** at the reactor.
- Further **prevent** the **growth of pathogenic micro-organisms** through **UV sterilization** for disinfection.
- The **pharmaceutical contaminants** (like **carbamazepine**) are removed in the presence of ozone nanobubbles and UVA irradiation.
- The volume of the water treated is **more** than **1 litre per day.**
- The **influent greywater** flows through the **treatment pathway** where the **controller** receives feedback from **sensing unit** that **determines the appropriate combination of unit operations** to clean greywater for potable and non-potable uses.

❖ *User Perspective:*

- That can channelize the **treatment process** for **potable & non-potable uses.**
- This compact **continuous-flow system** may be used **during natural calamity** like flood, drought & others, wherever there is scarcity of fresh clean water.

❖ *Industrial Perspective:*

- Said continuous-flow system may be applicable in **Hotels/Lodges/ restaurants/Resorts,** others in house applications.

IMAGE

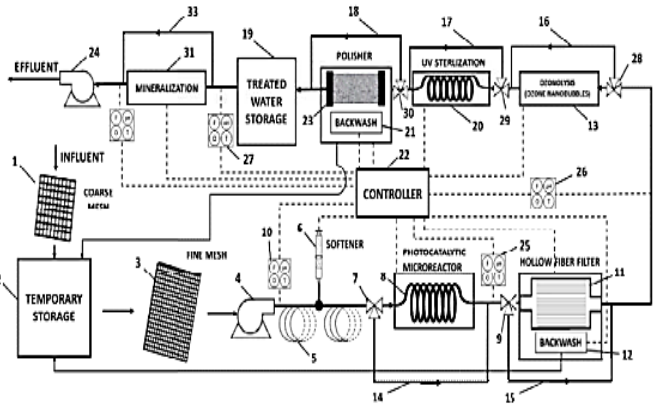

FIG.1: Illustrates continuous-flow greywater treatment unit.

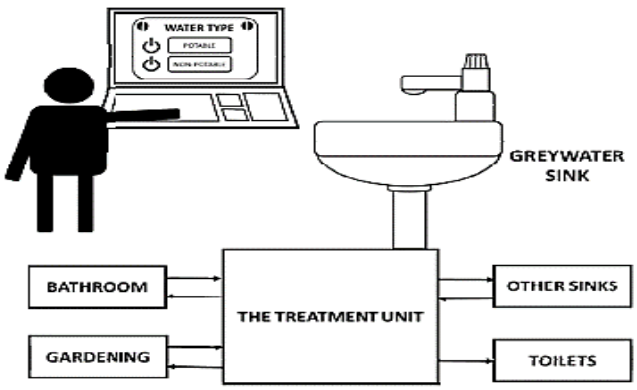

FIG.2: Illustrates greywater sink for treatment & recycling.

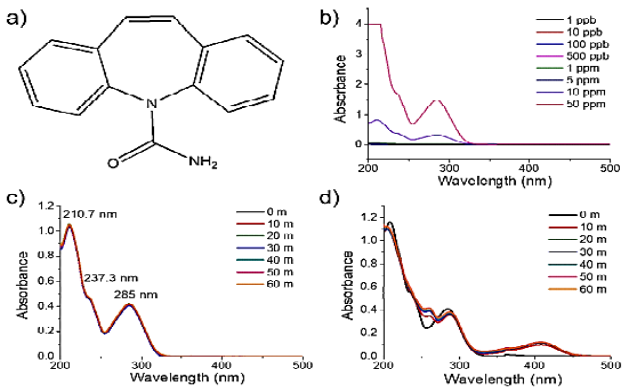

FIG.3(a-d): Illustrates performance of UV-vis spectroscopy to optimize the CBZ concentration suitable for degradation studies.

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