

KidneyLoop: A Modular DIY Water Sanitation System

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Overview

KidneyLoop is an open-source, modular water recirculation and sanitation system designed for DIY builders, off-grid users, emergency response teams, and innovators seeking affordable, sustainable water purification. Built from accessible parts like aquarium UV-C lights, food-grade tubing, rain barrels, and optional solar components, KidneyLoop mimics the function of a biological kidney — cycling and cleaning water continuously.

Project Goals

- **Affordability:** Use off-the-shelf parts ordered online or locally.
- **Modularity:** Expandable from 10 to 1000+ gallons.
- **Simplicity:** Assembly with minimal tools and skills.
- **Effectiveness:** Designed to remove particulates, bacteria, and heavy metals.
- **Transparency:** Fully open-source and licensed under CC0 (No rights reserved).

Core Concept

Water loops from a dirty tank through the following:

1. Micron filter (1–5 μ) to remove physical debris.
2. Optional activated carbon filter to reduce chlorine, VOCs, and heavy metals.
3. UV-C sterilizer (254 nm, 12W or higher) to kill bacteria and viruses.

4. Secondary micron filter to catch remaining particles or UV-affected debris.
5. Into a clean water barrel.

Then:

- A second pump recirculates the clean barrel back to the dirty one.
- Repeat 3–6 cycles or more depending on clarity and safety needs.

Example Components

- Rain Barrels (50 gal): [Famirosa collapsible PVC 50 gal rain barrel]
- Large Tank Option: 1000 gal FDA-grade tank (~\$800 from ntotank.com)
- Pumps: HiLetgo 240L/hr 12V DC micro pumps (2 pack ~\$13.69)
- Tubing: 1/4" ID x 3/8" OD food-grade vinyl tubing (50 ft ~\$19.99)
- UV Sterilizer: Coospider 12W 254nm UV-C inline sterilizer (~\$59.99)
- Optional: 20W SOLPERK solar panel + controller (for off-grid use)
- Carbon Filter: 10" block inline filter or under-sink housing w/ GAC

Assembly Instructions

1. Port Prep: Drill 2 holes in top of each barrel. Seal with barbed fittings, rubber washers, and Teflon tape.
2. Flow Setup: Dirty barrel → pump → micron filter → (optional carbon) → UV-C → micron filter → clean barrel.
3. Return Loop: Second pump routes clean barrel → dirty barrel.
4. Power Source: Plug into wall outlet or wire to solar panel + 12V battery.
5. Begin Looping: Watch for visual clarity, then test chemically if needed.

Cleaning, Maintenance, and Testing

- Pre-filtering: For muddy or green water, let sediment settle or pre-screen with fabric.
- Micron filters: Replace monthly or based on clarity.
- Carbon filters: Replace after 200–500 gallons depending on use.
- UV bulb: Replace after 6,000–8,000 hours of operation.
- Testing: Always use test strips or digital sensors for bacteria, metals, and chlorine.

Notes

- Volume & Time: For a 10-gallon loop, 3 cycles = ~30–60 minutes.
- Scalability: Multiple 1000-gallon tanks can be looped in series with individual UV-C and filter stations.
- Heavy Metals: Activated carbon or GAC filters are required for lead, fluoride, and chlorine removal.
- Safety Disclaimer: Not certified for drinking water. Untested build. Always test water before consumption.

Use Cases

- Flint, MI-style emergencies (lead-heavy municipal water)
- Off-grid homes with rain catchment systems
- Mobile disaster response and humanitarian deployment
- Homesteads and farms with uncertain well water

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GitHub & Community

We encourage community involvement and testing. Submit improvements, test results, or alternative builds.

GitHub: [[🌐 GitHub - Polymath8/KidneyLoop-Water-Filtration](#)]

Contact: [kidneyloopdiy@gmail.com]

“Water purification belongs to everyone.”