ENVIRONMENTAL SERVICES

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RX Destroyer and THC removal

C2R Global Manufacturing and Rx Destroyer

Unused medications are increasingly becoming a problem due to improper disposal. Pharmaceuticals are polluting wastewater treatment plants that are not equipped to remove them. Single-use disposal systems, such as the RX-Destroyer from C2R Global, solve this problem by providing an environmentally friendly and easy-to-use option as opposed to flushing or disposing of medication. The RX-Destroyer system uses activated carbon and proprietary ingredients to deactivate the active ingredients in over-the-counter medications and prescription medications.

Cannabinoids/THC (as hemp) were tested to determine the percent removal by the RX-Destroyer 16-ounce system. The concentrations remaining were determined using the calibration curves for each active ingredient and HACH ultraviolet-visible (UV) spectrophotometer (DR 6000) to calculate the unknown concentration. These results were used to develop an improved version with higher drug removal using a variety of activated carbons and the addition of various alcohols to the RX solution. The initial performance data for the upgraded product is shown below in Figure 1 and Table 1.

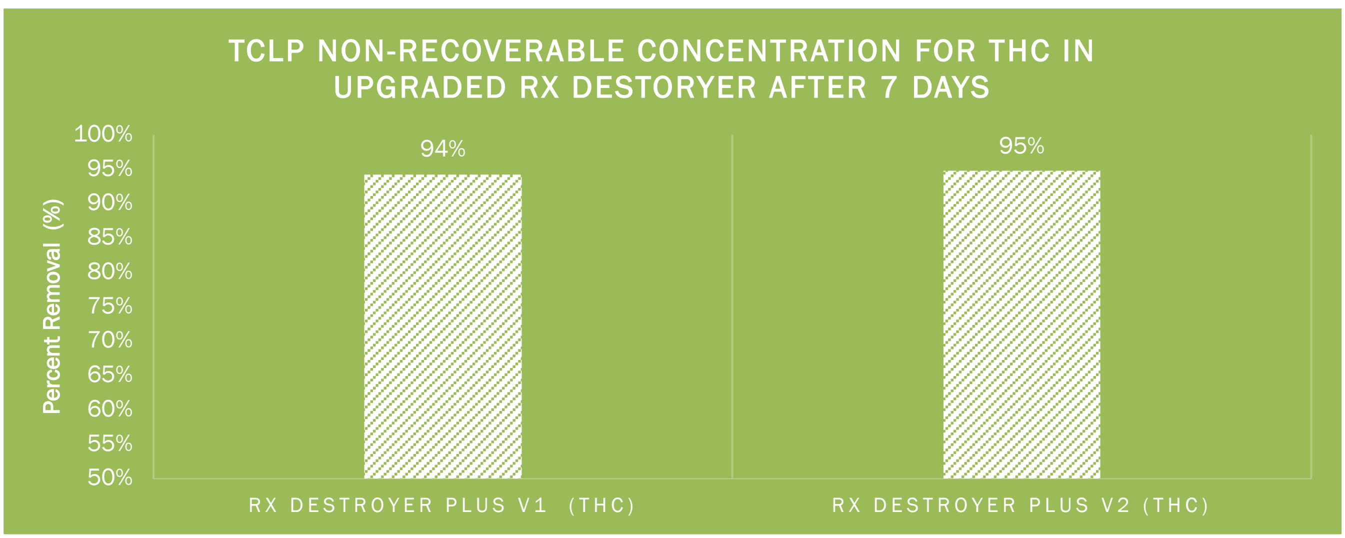

Figure 1: TCLP Day 7 THC Removal Efficiency using Hach Analysis

In addition to THC experiments, the Rx Destroyer Plus was tested at day 30 for over-the-counter drugs using the TCLP procedure with removal of over 99% as shown in Table 1 below.

Table 1. TCLP Results for New Formulation RX-Destroyer with Ibuprofen, Aspirin, and Sudafed using HPLC analysis.

Sample	Initial Theoretical Concentration (g/L)	Day 30 Concentration (g/L)	Percent Removal (%)
Ibuprofen	253	0.001	99.9
Aspirin	103	0.327	99.7
Sudafed	12.7	0.063	99.5

Since each drug medication tested as part of this work had different properties, our team used the EPA Toxicity Characteristic Leaching Procedure (TCLP) to determine the leaching potential. After use, the RX-Destroyer™ system may be disposed of in a landfill* and the TCLP is the standard procedure used in landfills to determine the leaching potential of contaminants.

*Always follow, facility, local, state, federal and tribal procedures, and laws.

Activated Carbon Application in Drug Removal/Deactivation

Adsorption by activated carbon is a multipurpose treatment technique practiced widely for contaminant and chemical removal across various applications worldwide. Activated carbon is ideal for removing small molecular organic compounds like pharmaceutical drugs due to the availability of high surface area, the combination of a well-developed pore structure and surface functional group properties [1,2]. The efficacy of pharmaceuticals removal by activated carbon has been very well studied worldwide [3,4,5,6,7]. The most relevant studies are summarized below for specific drugs.

Activated carbons are widely used clinically to treat accidental or deliberate drug overdoses. Administered in the form of a slurry to prevent drug absorption by the gastrointestinal tract and to enhance the elimination of drugs already absorbed. This treatment is recommended within 0.5–1.0h from the ingestion of a toxic amount of a drug.

About C12

C12 Environmental Services specializes in activated carbon consulting. Specifically, the team excels at developing and assisting with the selection of activated carbons for numerous applications. The team has developed one-of-a-kind carbons for mercury capture, food and beverage, potable water, and a myriad of other applications. The extensive experience provides a foundation to assist with market analyses, feasibility studies, product development, patent preparation, manufacturing design, full-scale plant build out, and assistance with plant commissioning/operation.

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