2016

Smart Medication Disposal: Subcritical Water Oxidation of Pharmaceutical Compounds

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Smart Medication Disposal
Subcritical Water Oxidation of Pharmaceutical Compounds

You may be drinking your neighbor’s medications – and not know it! Unused and expired pharmaceutical waste is growing. Smart and safe disposal methods are increasingly critical to preventing drug diversion and environmental pollution.

Water analysis from 24 major metro areas in the US, researchers found:
- Potable water tested contained significant amounts of antibiotics.
- Other drugs were routinely identified, including antidepressants, stimulants and birth control medications.

Our goal: develop a prototype medication disposal unit that can efficiently and safely inactivate medicinal compounds for a target market of pharmacies, assisted-care facilities, and hospitals.

Microwave Assisted Subcritical Water Oxidation is able to degrade multiple medications into non-active compounds, in a process that is energy efficient, safe, and scalable.

Hypothesis
Microwave Assisted Subcritical Water Oxidation is able to degrade multiple medications into non-active compounds, in a process that is energy efficient, safe, and scalable.

Market Analysis
The FDA and DEA recommend disposal of medications using absorbents (e.g. kitty litter). However, target institutions either use hazardous waste contractors or practice non-recommended disposal methods. With anticipated regulatory changes within FDA, DEA and EPA, this device will provide an approved, safe, eco-friendly and cost-effective means of drug disposal.

Results

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Uses</th>
<th>Degradation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaminophen</td>
<td>Pain reliever and fever reducer</td>
<td>Yes</td>
</tr>
<tr>
<td>Aspirin</td>
<td>Pain reliever and fever reducer</td>
<td>Yes</td>
</tr>
<tr>
<td>Cetirizine</td>
<td>Antihistamine</td>
<td>Yes</td>
</tr>
<tr>
<td>Phenylephrine</td>
<td>Decongestant and Vasodilator</td>
<td>Yes</td>
</tr>
<tr>
<td>Loperamide</td>
<td>Anti-diarrheal</td>
<td>No</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>Vitamin Supplement</td>
<td>No</td>
</tr>
</tbody>
</table>

Acknowledgments: Special thanks to Dr. Gupton, Professor Krack and Michael Burkeholder for their help, expertise, and use of their labs.