



Implementing the  
**Principles of Green Chemistry**  
into an existing water treatment system  
using a simple-to-replace,  
safer-to-use, solid technology



JAMESTOWN TECHNOLOGIES

**Water Resource  
Specialists**

*An innovative, safer, solid water treatment  
technology for cooling and boiler systems,  
closed-loop applications*

*Includes various corrosion inhibitors,  
microbiocides, scale inhibitors and other  
treatments. From Jamestown Technologies,  
a leading manufacturer and supplier of water  
treatment systems for industrial, commercial,  
and government buildings and facilities.*



U.S. Environmental Protection Agency  
Presidential Green Chemistry Award Nominee.

# 12

## PRINCIPLES OF GREEN CHEMISTRY

A guideline of methods  
introduced to the Chemical  
Manufacturers Association  
to address ongoing  
environmental concerns,  
to reduce carbon footprints  
and help facilities gain  
LEEDs points.



## Prevent Waste

*Design chemical syntheses to prevent waste, leaving no waste to treat or clean up.*

**Solid Solutions** Green Water Treatment Programs are designed with ecologically-acceptable chemicals, procedures and recyclable packaging.

The simple operating system combines the right concentration of chemical with the right amount of tap-water, diluted to an application-specific optimum efficiency.

*The design of the Solid Solutions system offers:*

- No disposal issues
- 100% consumption with consistent concentration strength
- No left-overs or by-products in the waste-stream
- Equipment is rinsed with plain water, safe for virtually all municipal drainage systems



## Design safer chemicals and products

*Design products with virtually no toxicity.*

**Solid Solutions** offer users powerful, extremely effective methods to control scale prevention, corrosion protection, microbial growth prevention and control, and fouling.

Despite its potent capabilities, Solid Solutions have been *proven to be safer and more effective than most comparable, liquid-based technologies*. And, since the recyclable (HDPE 2) containers are placed directly into a fully automated mixing panel, there is *no direct physical contact during handling*.



**Physically, Solid Solutions remains in a solid state within its container. It is not a liquid or powder. No fumes, inhalation or physical contact. There are no liquid storage or handling issues. Risks and liabilities are minimized.**



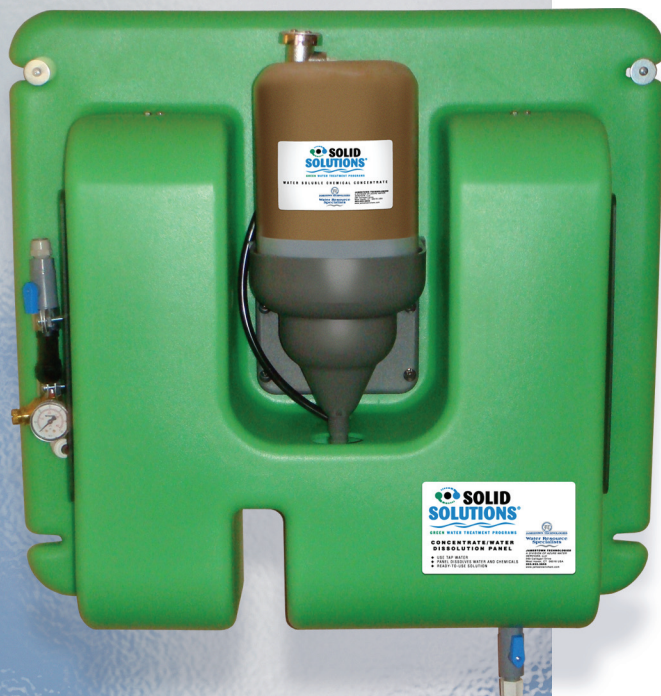
## Less hazardous chemical syntheses

*Design syntheses to use and generate substances with little or no toxicity to humans and/or the environment.*

Unlike liquid-based treatments, no acids and minimal caustics are used in manufacturing Solid Solutions products.



**Simple, quick and easy to install.  
Compact wall mounted panel provides  
built-in spill containment and a  
dual-solenoid safety system.**



4

#### **Use renewable feedstocks**

*During manufacturing use raw materials that are renewable, not depleting (avoid fossil fuels or mined components). Where possible, use other waste by-products or replaceable organics.*

Solid Solutions are packaged in recyclable materials.

5

#### **Use catalysts, not stoichiometric reagents**

*Avoid adding harmful chemical agents during the manufacturing operations.*

Only heat and cooling are used as a catalyst during the Solid Solutions manufacturing process.

6

#### **Avoid chemical derivatives**

*Prevent reformulated compounds.*

No binders or supplemental caustics are required to dilute or enhance the solubility of Solid Solutions (only tap-water).

7

#### **Maximize atom efficiency**

*No wasted atoms during the process.*

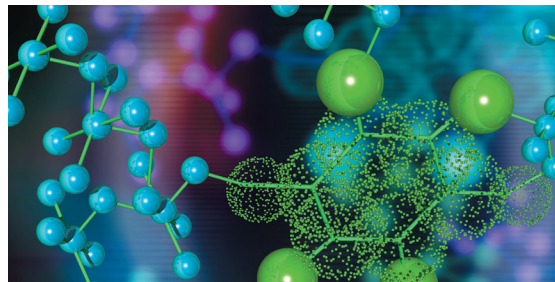
Because Solid Solutions requires no promoters or enhancers added to the dissolving procedure there are no unnecessary by-products or extraneous atoms that need to be neutralized or removed.

8

#### **Use safer solvents and reaction conditions**

*Avoid using solvents, separation agents or other auxilliary chemicals. When necessary use innocuous chemicals.*

Solid Solutions doesn't use any recognized environmentally hazardous components.





### **Increase energy efficiency**

*Chemical reactions should be at ambient temperatures and pressure when possible.*

Solid Solutions are designed for use with room temperature “tap-water” where temperatures and feed-pressures are controlled by typical municipal water systems. No temperature or pressure changes required.



### **Design chemicals and products that degrade after use**

*Produce products that do not impact, change or accumulate in the environment.*

Solid Solutions uses only environmentally acceptable and biodegradable components in its formulation.



### **Analyze in real time to prevent pollution**

*In-process, real-time monitoring to prevent or minimize unwanted byproducts.*

Solid Solutions utilizes existing conventional (liquid-type) testing, control, feed activation and monitoring systems. No specialized equipment required. Technology is easily adaptable to existing water treatments.



### **Minimize potential for accidents**

*Design chemicals and forms (solid, liquid or gas) to minimize the potential for chemical accidents including explosions, fires and releases into the environment.*

- Solid Solutions are the safest water treatment option for facilities operators.
- Depending on application requirements, a 4 gal. case of Solid Solutions (weighing less than 50 lbs.) generates an equivalent of a drum of liquid water treatment (55 gal.), weighing over 500 lbs.
- If all water treatment systems utilized Solid Solutions products, the transportation savings and reduced carbon footprint would equal to the removal of 31,000 automobiles each year!
- Hazardous liquid chemical spills from accidents during shipments would be completely eliminated.

---

The 12 Principles of Green Chemistry were originally published by Paul Anastas and John Warner in “Green Chemistry: Theory and Practice” (Oxford University Press: New York, 1998). This document addresses the concerns raised in the aforementioned report and does not intend to suggest or imply an endorsement by the authors or their publisher of Solid Solutions, Jamestown Technologies, its products, services, or its affiliated companies.