



Design for the Environment

FORMULATOR APPROACH



Presentation for Unified Green Cleaning Alliance
October 3, 2002

Design for the Environment



- Incorporates Environmental Thinking Into Business Decisions
- Operates Via Voluntary Partnerships
- Advances Risk Reduction and Pollution Prevention
- Helps Business Find Innovative Approaches to Environmental Challenges

Billions of Pounds of Ingredients Handled and Released into the Environment Each Year

- Significant Pollution Prevention Opportunity
 - For EPA
 - For Formulators Who Care about the Environment
 - For Concerned Businesses and Other Chemical Users

Pollution Prevention Operating Principle

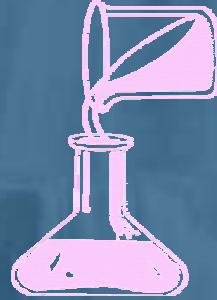
“Less Toxic, More Biodegradable, Less Persistent,
Less Bioaccumulative—and Byproducts with
Similar Beneficial Characteristics.”

Result: Formulations with a More Positive
Health and Environmental Profile

Corollary: “If It Isn’t In Your Formulation,
You Don’t Have to Worry About It!”

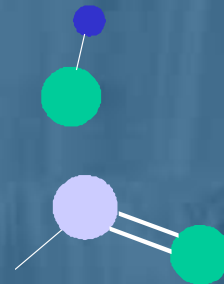
Formulators Seek EPA Expertise, Advice, and Recognition

- Environmental Consultant
- Information Sharing, including New “Green” Ingredients
- Recognition for Improvements
- Extension of Partnership to End Users



What Does DfE Assess?

- All Ingredients in a Formulation—focusing on chemical properties/hazard
- Potential Safer Substitutes—including performance characteristics, if possible
- Opportunity for Environmental Improvement—targeting chemicals of concern



IMPROVED DETERGENT FORMULATIONS

SURFACTANTS

⑥ Positive Environmental Characteristic:

Biodegrade readily to compounds with low toxicity

Examples: Straight-carbon-chain compounds like Linear Alcohol Ethoxylates and Linear Alkyl Sulfonates

☰ Key Characteristic of Concern:

Toxicity of biodegradation byproducts and potential endocrine effects

Example:

Alkylphenol ethoxylates (includes nonylphenol and octylphenol ethoxylates)

IMPROVED DETERGENT FORMULATIONS BUILDERS

⑥ Positive Environmental Characteristics:

Biodegrade readily to compounds with low environmental concerns. Mild pH.

Examples: Maleic anhydride derivatives (e.g., iminodisuccinate and polyaspartic acid)

Sodium Citrate, Silicates, and Zeolites

☰ Key Characteristics of Concern:

Potential to cause oxygen depletion in fresh water. Elevated pH or other concerns.

Examples: Inorganic phosphates, Caustics (e.g., sodium metasilicate), and NTA

IMPROVED DETERGENT FORMULATIONS

SOLVENTS

⑥ Positive Environmental Characteristics:

Low toxicity to humans and the environment.

Examples: Propylene glycol ethers

Methyl soyate, and Ethyl lactate

☐ Key Characteristics of Concern:

Toxicity to humans and aquatic organisms.

Examples: For human health concerns—Ethylene glycol-based compounds

(e.g., butyl cellosolve)

For environmental concerns—*d-limonene*

Formulator Partners in Cleaning Sector

Laundry Detergents

Anderson Chemical Co.—TIP Program
Gemtek—Safe Care Laundry
Norchem Corp.—NuPhase/Maximize
Noramtech Corp.—Wash ‘N Bleach X2
EnviroSmart—Liquid Laundry Detergent
Sunburst—Compass

Industrial/Institutional Cleaners

Cosmarc—Eliminator Plus
Gemtek—Safe Care 1000
Penetone—Penetone ET
PolyChem—Acrastrip

DfE Formulator Approach

“I got a terrific education and learned things about chemical compounds our industry has been using for years, blissfully unaware of the damage we were doing.”

*--Mike Oberlander, President
Noramtech Corporation*