

How Can We Improve Our Environmental Relationship with New Chemicals?

Mary O'Brien
Eugene, Oregon

Our Largest Relationships



System Conditions

- Substances from the earth's crust must not systematically increase in nature.

System Conditions (cont.)

- Substances produced by society must not systematically increase in nature

System Conditions (cont.)



- The physical basis for the productivity and diversity of nature must not be systematically diminished.

System Conditions (cont.)



- We must be fair and efficient in meeting basic human needs

Our Relationship With New Chemicals

- 1. Bringing in new, cleaner chemicals and engineering
- 2. Moving away from old, toxic chemicals and engineering

Four Hopeful Processes

1. TSCA New Chemicals Review
2. Massachusetts Toxics Use Reduction Act
3. Green Chemistry and Green Engineering Initiatives
4. The Substitution Principle in Proposed Legislation

1. TSCA New Chemicals Review

TSCA New Chemicals Review 1990-2004

32,000 PMNs

1,200 More testing required

1,200+ SNURs added

1,600+ PMNs withdrawn

TSCA New Chemicals Review Positive Outcomes

- EPA provides deterrence and guidance
- Companies provide requested tests
- EPA has identified chemical categories
- EPA trains in upfront, safer chemical design

New Chemicals

Approximately 1%
by volume of
chemicals in production

Old Chemicals

75,000 chemicals in commerce
Five chemicals restricted

TSCA Advances

- Precautionary threshold for action
- Deterrence
- Guidance

“TSCA” Gaps

No TSCA-like premanufacture
review for:

Foods

Drugs

2. Massachusetts Toxics Use Reduction Act

Massachusetts Toxics Use Reduction Act
(cont.)

Every two years
manufacturers **assess alternatives**
to any of
1,300 hazardous chemicals they use

Massachusetts Toxics Use Reduction Act
(cont.)

Manufacturers
track inputs and outputs
of any of
1,300 hazardous chemicals they use

Massachusetts Toxics Use Reduction Act
(cont.)

Manufacturers
pay fees
and
receive technical support

Massachusetts Toxics Use Reduction Act
1990-2000

- 550 firms with continuous participation
- 58% hazardous/toxic waste reduction
- 40% reduction in use of the 1,300 chemicals
- 90% reduction in TRI releases

Massachusetts Toxics Use Reduction Act 1990-1997

- Massachusetts firms saved \$15 million
- ...Not counting worker health and environmental benefits

Massachusetts Toxics Use Reduction Act Gaps

- Low-volume users (e.g., drycleaners)
- Products entering the state
- Incomplete state agency engagement

Massachusetts Toxics Use Reduction Act Advances

- Requirement to assess safer alternatives
- Fees on toxic chemicals return as technical support for toxics use reduction
- Recordkeeping
- Positive relationships between manufacturers and TUR technical support

3. Green Chemistry and Green Engineering

Green Chemistry Principles

- 1. Prevent waste**
- 2. Design safer chemicals**
- 3. Design less hazardous chemical syntheses**

Green Chemistry Principles (cont.)

- 4. Use renewable feedstocks**
- 5. Use catalysts, not stoichiometric reagents**
- 6. Avoid chemical derivatives**

Green Chemistry Principles (cont.)

- 7. Maximize atom economy**
- 8. Use safer solvents and reaction conditions**
- 9. Increase energy efficiency**

Green Chemistry Principles (cont.)

- 10. Design chemicals and products for benign degradation**
- 11.11. Analyze syntheses in real time to prevent pollution**
- 12.12. Minimize the potential for accidents**

Green Engineering Principles

- 1. Strive for inherently benign material and energy inputs and outputs.**
- 2. Prevent waste.**
- 3. Design separation and purification operations to minimize energy and materials use**

Green Engineering Principles (cont.)

- 4. Maximize mass, energy, space, and time efficiency.**
- 5. Design products, processes, and systems to minimize inputs and avoid overproduction.**
- 6. Design complex products for reuse; simple products for value-conserving recycling or beneficial disposition.**

Green Engineering Principles (cont.)

- 7. Design for durability rather than persistence**
- 8. Avoid unnecessary capacity or capability**
- 9. Minimize material diversity in multicomponent products**

Green Chemistry Principles (cont.)

- 10. Link local material and energy flows.**
- 11. Design products, processes, and systems so that components can be reused or reconfigured.**
- 12. Use renewable materials and energy.**

4. The Substitution Principle in Proposed Legislation

Substitution =

**Replacing a hazardous chemical by a
safer or non-hazardous chemical,**

or

**replacing the hazardous chemical's
function with product redesign or
system change.**

Substitution

- Assesses alternatives
- Assesses inherent hazards
- Forces innovation
- Implements the precautionary principle

REACH

Registration, Evaluation
and
Authorisation of Chemicals

REACH

“Chemicals of very high concern”

- Carcinogens
- Mutagens
- Reproductive toxins
- Persistent, bio-accumulative and toxic chemicals
- Very persistent and very bio-accumulative chemicals
- Chemicals of similar concern, e.g. endocrine disrupters

“An Act For A Healthy
Massachusetts: Safer Alternatives
To Toxic Chemicals”

An Act for a Healthy Massachusetts (cont.)

- Identification of safer alternatives for ten priority chemicals or chemical groups
- Technical and grant support to users to substitute safer alternatives
- Reemployment assistance and vocational training

An Act for a Healthy Massachusetts (cont.)

- Public lists of “safer” products
- Multi-stakeholder Safer Alternatives Oversight Board
- Chemicals can be added after three years

Sweden: 15 National Quality Objectives

1. Reduced Climate Impact
2. Clean Air
3. Natural Acidification Only
4. A Non-Toxic Environment
5. A Protective Ozone Layer

Sweden: National Quality Objectives (cont.)

6. A Safe Radiation Environment
7. Zero Eutrophication
8. Flourishing Lakes and Streams
9. Good-Quality Groundwater
10. A Balanced Marine Environment

Sweden:
National Quality Objectives (cont.)

11. Thriving Wetlands
12. Sustainable Forests
13. A Varied Agricultural Landscape
14. A Magnificent Mountain Landscape
15. A Good Built Environment

SWEDEN:

“The overall goal is that,
within one generation,
the major environmental problems
currently facing us
will have been solved.”

What's the Alternative?

