

## Pollution Prevention (P2) for Personal Care Products Manufacturing

Reduce environmental impacts by developing personal care products that contain fewer toxic substances and generate less hazardous waste during the manufacturing process and by considering green chemistry, conserving resources, practicing inventory control and implementing lean manufacturing.



### Inventory Control

To prevent pollution, first implement inventory control techniques. Inventory control can help your company utilize raw material efficiently and reduce waste generation.

#### Inventory control tips

- Keep records of materials purchased, received, returned and used. Be sure to track expiration dates and employ the First-in, First-out (FIFO) method, using the oldest materials first.
- Consider minimizing your inventory and incorporate a just-in-time system, moving material once it is received so it can immediately be used.
- Store material in clean and dry areas to prevent spills and leaks, and check containers for damage.
- Contact your supplier and determine if expired material can be used or returned.

### Green Chemistry

#### What is it?

According to the EPA, green chemistry<sup>1</sup> is the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances.

Green chemistry benefits human health and the environment, as well as the economy and business.

Educate yourself and incorporate green chemistry into your personal care product manufacturing process.

See *American Chemical Society (ACS) Textbooks, Lab Manuals & Reference Materials*<sup>2</sup> to learn more about green chemistry. Also, see the *Michigan Green Chemistry Clearinghouse*<sup>3</sup> which contains links to external organization websites involved in green chemistry.

### Free tools for green chemistry and engineering

ACS's innovative tools for green chemistry and engineering<sup>4</sup> are available to the public and include:

- A reagent guide that encourages chemists to choose a 'greener' choice in reaction conditions.
- A process mass intensity calculator that was developed to benchmark and quantify improvements for a greener manufacturing process.

MIT provides a [Green Chemical Alternatives Purchasing Wizard](#),<sup>5</sup> intended to help reduce hazardous waste and money in research. Also, the [ACS Webinars and Videos](#)<sup>6</sup> website has recorded videos addressing green chemistry involved in a variety of topics.

EPA's [Safer Chemical Ingredient List](#)<sup>7</sup> contains safer alternatives for various chemicals used in the personal care product manufacturing industry.

## Lean Manufacturing

Lean is a set of principles and methods used to identify and eliminate waste in any process. According to the EPA, Lean implementation efforts can create powerful coattails for environmental improvement since environmental impacts are embedded within the production wastes targeted by Lean.

The environmental benefits of Lean manufacturing include:

- Reducing waste by improving and/or modifying processes to use fewer chemicals, less energy and less water and generate less hazardous waste.
- Making better use of raw materials, energy and water and other non-renewable resources.
- Measuring and developing metrics to improve processing and make raw material purchase and input more efficient.
- Reducing waste in the manufacturing, transport, packaging and delivery processes, resulting in economic savings and environmental benefits.

### Lean manufacturing resources

<sup>11</sup>[Lean Manufacturing and the Environment](#)

<sup>12</sup>[Lean and Environment Toolkit](#)

<sup>13</sup>[The Lean and Chemicals Toolkit](#)

## Energy Conservation

Conserve energy in your manufacturing plant by taking simple steps such as:

- Properly maintaining and calibrating manufacturing equipment to ensure it is functioning efficiently.
- Investing in energy efficient equipment and technologies.
- Contacting your energy provider to conduct an energy audit and understand how energy is used in your manufacturing process.

See the Energy Star Program's Buildings and Plants<sup>8</sup> to help you take action to save energy and money. Also, see the Department of Energy's Advanced Manufacturing Office<sup>9</sup> website to learn about saving energy in your business manufacturing.



## Water Conservation

Save water at your manufacturing facility by:

- Developing a program to detect leaks and repair them immediately.
- Using submeters to measure water usage for specific activities like process use and landscape use.
- Saving water to save energy since heating water uses energy.
- Educating staff to participate in water conservation.

Check out WaterSense' resources, tools and trainings<sup>10</sup> to identify water use and best management practices.

## References

<sup>1</sup> [EPA. Green Chemistry.](#)

<sup>2</sup> [American Chemical Society. Textbooks, Lab Manuals & Reference Materials.](#)

<sup>3</sup> [Michigan Green Chemistry Clearing House.](#)

<sup>4</sup> [ACS. Tools for Green Engineering.](#)

<sup>5</sup> [Massachusetts Institute of Technology. Green Chemical Alternatives Purchasing Wizard.](#)

<sup>6</sup> [ACS. Webinars and Videos.](#)

<sup>7</sup> [EPA. Safer Choice. Safer Chemical Ingredients List.](#)

<sup>8</sup> [Energy Star. Buildings and Plants.](#)

<sup>9</sup> [Department of Energy. Advanced Manufacturing Office.](#)

<sup>10</sup> [EPA. WaterSense. Tools.](#)

<sup>11</sup> [EPA. Lean Manufacturing and the Environment.](#)

<sup>12</sup> [EPA. Lean and Environment Toolkit.](#)

<sup>13</sup> [EPA. Lean and Chemicals Toolkit.](#)