

Talking Trash—Solid Wastes

Objectives

1) Analyze trends in the generation and reclamation of solid wastes within the United States over time.

Green Chemistry Principles

- It's midnight. Do you know where your product is?
- Wastes? Why make them?

IL State Standards (Science)

11.A.3e, 11.A.3f, 11.A.3g, 11.A.4a, 11.A.4d, 12.E.3c, 13.B.4d

Levels

Middle school to high school

Vocabulary

Municipal solid waste (MSW), biodegradable, composting, landfill, source reduction

Materials

Graph paper, chalkboard, whiteboard, flipchart or graphing software

Time

One class period

This material is adapted from the ACS text *Introduction to Green Chemistry*. See the “references” section of the introduction to this manual for additional information on this text.

Background/Overview

We discard many different types of “waste” every day, and yet we seldom stop to think about what happens when we throw things “away”—what do we really even mean by “away?” What is the impact of all the “stuff” we throw “away” once it gets there? The principles of green chemistry are meant to encourage people to think about the fate of the products they create, and to reinforce the idea that nothing every really goes “away.” If our products are not biodegradable (able to be broken down by organisms in the environment, such as bacteria or fungi) or recyclable, what will we do with them? Will any of our wastes be potentially harmful? Once we consider the fate of our products, we can also consider modifying our actions so we end up producing less waste to deal with, or at least producing types of waste that are easier and safer to deal with. In this exercise, students will examine data on the amounts of municipal solid waste generate and recovered in the U.S. over time, as one illustration of the importance of considering the fate of the products we create and dispose of.

The U.S. Environmental Protection Agency (EPA) gathers data every year on the quantity of municipal solid waste (MSW)—otherwise known as garbage, trash, and junk—generated in the United States. MSW consists of items such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, paint, and batteries (see table).

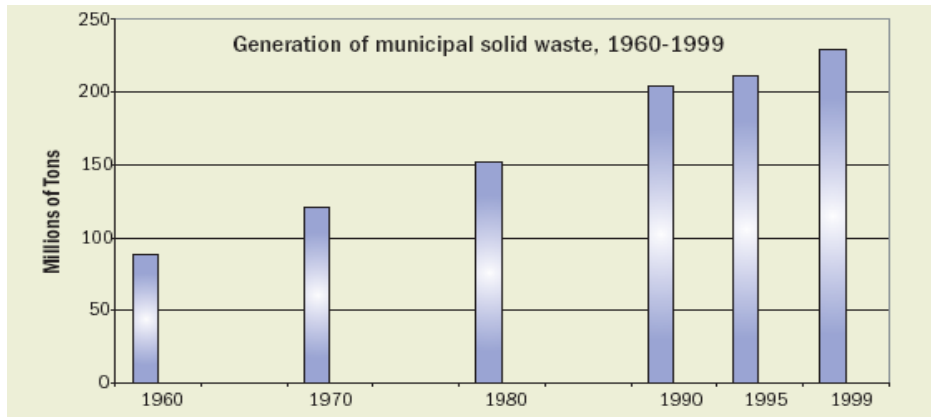
Generation, materials recovery, composting, and discards of municipal solid waste, 1960-1999 (in millions of tons)						
	1960	1970	1980	1990	1995	1999
Generation	88.1	121.1	151.6	205.2	211.4	229.9
Recovery for recycling	5.6	8.0	14.5	29.0	45.3	50.8
Recovery for composting*	Negligible	Negligible	Negligible	4.2	9.6	13.1
Total materials recovery	5.6	8.0	14.5	33.2	54.9	63.9
Discards after recovery	82.5	113.0	137.1	172.0	156.5	166

*Composting of yard trimmings and food wastes

Source: Franklin Associates. Table appears in the EPA report *Municipal Solid Waste in the United States: 1999 Facts and Figures*, www.epa.gov/epaoswer/non-hw/muncpl/pubs/excsum99.pdf.

Activity and questions for discussion (Answers included)

1) Prepare a bar chart of total quantity of solid waste generated (shown in the row labeled “Generation”) for each year shown in the table, using graph paper, graphing software, or simply drawing on the chalkboard as a class. Discuss the trend indicated by your graph and possible reasons for this trend.



The amount of municipal solid waste has increased in a nearly linear fashion over the past 40 years. The amount for 1990 was higher than the trend line.

2) What percentage of solid waste was recycled in 1960 versus 1999? What are some possible reasons for the change?

In 1960, only 6.3% of the total was recycled. In 1999, this was up to 27.8%. One reason evident from the table above is the increase in recovery from composting. Public awareness of the need to recycle is much higher today than it was in 1960. Many municipalities have curbside recycling available today, but such programs were rare in 1960.

3) What is composting? Look up information on this if you are not sure. Why would composting of yard trimmings and food waste be a better method of disposal rather than burying these wastes underground in a landfill?

Composting is the accelerated decomposition of yard and kitchen scraps in a bin or pile for use as fertilizer. The compost is sometimes mixed with manure to accelerate the process. Backyard composting is superior to landfilling in many ways. It eliminates the need for transporting the waste, reduces the amount of material in the landfill, and provides ideal conditions for decomposition. Because landfills are well sealed, it can take a very long time for the contents to decay.

4) In 1960, the quantity of solid waste generated *per person per day* was 2.68 pounds. By 1999, it had increased to 4.62 pounds. What are the implications of continuing this trend? List some ways of reducing the quantity of waste generated.

Increasing waste not only uses up valuable resources, but also creates the problem of finding adequate space at disposal sites or in landfills. The EPA suggests the strategies listed below to reduce household solid waste. Many apply to hazardous waste as well. This list might be the basis for a class discussion.

Strategies for reducing waste

Reduce

- Reduce the amount of unnecessary packaging
- Adopt practices that reduce waste toxicity.

Reuse

- Consider reusable products.
- Maintain and repair durable products.
- Reuse bags, containers, and other items.
- Borrow, rent, or share items used infrequently.
- Sell or donate goods instead of throwing them out.

Recycle

- Choose recyclable products and containers, and recycle them.
- Select products made from recycled materials.
- Compost yard trimmings and some food scraps.

Respond

- Educate others on source reduction (also called waste prevention) and recycling practices.
- Make your preferences known to manufacturers, merchants, and community leaders.
- Be creative—find new ways to reduce waste quantity and toxicity.

Ideas for further study

For links to further information on municipal waste generation and recycling, see EPA's Municipal Solid Waste page at <http://www.epa.gov/epaoswer/non-hw/muncpl/index.htm>.

Visit the EPA's Office of Solid Waste Kids' Page at <http://www.epa.gov/epaoswer/non-hw/muncpl/index.htm> for activities and games related to solid waste.