

Lesson 1: “Better Living Through Chemistry?”: Exploring the Role of Plastic in Post-WWII American Culture

Understanding Goals:

In this lesson, students will:

- Learn why plastics became such a pervasive part of American society during the postwar era.
- Explore early concerns about the potential effects of plastics on workers’ health
- Examine why different individuals and organizations evaluated and perceived risk differently

Lesson Overview:

The lesson will begin by first assessing what students know about synthetic chemicals associated with plastic. Recently, there has been growing concern about how certain chemicals associated with plastic, including PVC, bisphenol-A, and phthalates affect human and environmental health. Some students may have heard about these concerns; others may know very little about the subject. By first assessing what students know about the topic, the teacher will gain a deeper understanding of the knowledge that students bring to the classroom. It will provide a starting point to help students think about how different understandings of plastic’s effects on health are generated and reinforced. These preliminary conversations will demonstrate the point that how we know what we know is based on a wide variety of sources. It will help students recognize that we do not always evaluate these sources critically or thoroughly.

After assessing students’ initial ideas through small and large-group discussion, the teacher will provide some background on the history of the boom in the chemical industry and the production of plastics during the postwar era. Background information and additional resources are listed below. Students will also have an opportunity to analyze primary documents from the 1950s and ‘60s to reinforce the idea that plastics became a significant part of the American society as a result of several of economic, cultural, and political factors. Then students will analyze primary documents to explore how and why new understandings about the relationship between and workers’ health emerged. This introductory lesson will help students understand the origins of debates over the regulation of synthetic chemicals.

Background Information:

From the cars we drive, to the computers we work on, to the water we drink, plastic has become a pervasive part of our society today. It has become such a ubiquitous part of our lives that is difficult to imagine a world without plastic. This introductory lesson will help students understand how plastic came to infiltrate virtually all aspects of our lives.

Plastic was first invented in the 1860s by Alexander Parkes in London. Known as Parkesine, the first plastic was made from cellulose and other organic materials. It served the same functions as rubber, but it was cheaper to produce. In 1869, an American chemist named John Wesley Hyatt produced the first thermoplastic—a substance shaped under pressure and heat that retains its shape when cooled. Known as celluloid, it was first used to replace ivory in billiard balls and provided materials for the first moving pictures. In 1907, Leo Baekeland developed Bakelite—a form of thermoplastic that was even more durable than previous plastics. In addition to a variety of household uses, the U.S. military used bakelite to produce lightweight weapons. War machinery improved with bakelite was extensively used in WWII. Also, prior to WWII, other notable thermoplastics such as polyvinyl chloride (PVC), polystyrene, and polyethylene came into production. As demand for resources

increased during the war, these new plastics began to play an increasingly important role in American society.

To support the war effort, engineers created a wide array of new products and lightweight materials—including everything from weapons to food packaging (Saran Wrap was a WWII invention). After the war, the production of plastic products for civilian uses increased exponentially. Plastics became a versatile symbol of the benefits of the growing industry. “Better living through chemistry” became Du Pont’s slogan and other chemical companies such as Dow, Monsanto, and Union Carbide and others also launched massive advertising campaigns. These campaigns depicted plastic as a savvy substance that could be molded to meet the many needs of modern society. At the same time that chemical companies claimed that new plastic goods would provide solutions to an array of modern problems, the industry was also becoming aware of some of the deleterious effects that certain had on human health. We will explore the emergence of these new understandings in the latter part of this lesson.

Preparation:

This lesson involves small group activities and large group discussion. The teacher will provide some history on plastic between activities and should be familiar with the material in the background information section. There are also additional resources listed at the end of the lesson where teachers can go for more information on the subject. Documents used for primary analysis can be downloaded directly off this site. Teachers can click on the links and print out copies of the documents for students to use in class.

Activity 1.1: Assessing Students’ Understandings about Plastic: From initial uses to potential effects

Assess students’ existing knowledge about plastic’s origins and its effects on human and environmental health. Ask students to reflect silently and then write down their ideas on the following questions:

1. Why do you think plastic was initially created? What purpose did it serve? Where was it first invented and used? By whom?
2. Why do you think people would have welcomed the invention of plastic in the early twentieth century? In the mid-twentieth century?
3. What do you know about how plastic affects human health? How does plastic affect the environment?

Assure students that you don’t expect them to have the “right” answer at this point. Emphasize that you want them to think about plausible initial uses and past problems that plastics may have been invented to solve. Also, tell them that the point of this introductory activity is to assess the range of ideas that are out there about the relationship between plastic and health.

Large group discussion:

Students can all share their ideas by going around the whole class in a circle, or the teacher can ask a few willing individuals to share. Students will most likely come to class with a range of ideas based on an equally wide range of sources. When discussing their ideas about how plastic affects health, ask them where they got their information. This large-group discussion need not be too long or involved; simply emphasize the wide range of initial ideas and sources of where we get our information.

Activity 1.2: Exploring Multiple Causes of the Postwar Boom in the Plastic Industry

The teacher will explain that the postwar growth of the chemical industry was the result of a variety of economic, cultural, and political factors (i.e. the boom in petroleum production, the portrayal of plastic in popular media, the faith in science and technology, and the power and influence of the chemical companies). Depending on the amount of class time available and familiarity of the teacher with the subject, this talk can last from 8-15 minutes. In addition to the background material provided, teachers can also access other resources at links provided at the end of this unit.

Analyzing Primary Sources:

After the teacher explains some of this background material, students will have an opportunity to analyze a range of documents from the 1950s and '60s about the status of plastic in American society. Have students count off by two and explain that the “ones” will analyze document A, the “twos” will analyze document B, “threes” analyze C. Each group will analyze one of the three documents. Document “B” involves two separate advertisements, since the other documents will take a little longer to read and analyze. Depending on class size, there may be two or three groups assigned to each document. Electronic versions of these documents are available at the links provided below.

Documents for Activity 1.2:

- A. Kirtley F. Mather, “Petroleum—Today and Tomorrow,” *Science*, New Series, Vol. 106, No. 2764, (Dec. 19, 1947), pp. 603-609.
- B. Two advertisements from chemical companies:
- C. “News from Du Pont,” Display ad in the *New York Times*, January 3, 1956.
- D. “This is the World of Union Carbide,” Display ad in the *New York Times*, January 9, 1961.
- E. “The Master Technicians” *Time Magazine*, Friday, Nov. 27, 1964. Article and front cover.

Small group discussion:

Have the students discuss the following questions:

1. Who was/were the authors of this document?
2. Who was the intended audience of this document?
3. Why do you think this document was written? What evidence does the document contain that makes you think it was produced for that reason? Please refer to specific quotes or details from the document.
4. Based on this document, why do you think plastic came to hold such an important place in postwar American culture?
5. What does this document reveal about the status of plastic and plastic production in contemporary American society?
6. What does it NOT say? That is, what does this document hide—intentionally or unintentionally? List three questions that are left unanswered by the document.

After talking about the perspectives offered by the different documents in small groups, the class will reconvene in a large group. A student representative from the small group will explain how their document addresses the question: “Why did plastics become such an important part of American society after WWII?” Ask students to think about how different economic, cultural, and political factors influenced the rise of the plastics industry.

Activity 1.3: Analyzing Understandings of Plastics’ effect on Workers’ Health

The purpose of this activity is get students to think about ways that the postwar boom in plastic production affected human and environmental health. It will explore understandings that developed

in the 1950s about the relationship between plastics and health. In their same small groups, students will examine Documents A, B, and C. Because documents A and B will take longer to read and analyze, document C contains two different sources for students to work on. These documents illustrate different understandings of how the production of plastic affected (or did not affect) human health. Depending on time available, this activity can be done in class or assigned to students to complete at home.

Documents for Activity 1.3:

- A. D. Kenwin Harris, “Health Problems in the Manufacture and Use of Plastics,” *British Journal of Industrial Medicine*, vol. 10, 1953. Students should read pages 255 to the top of page 261. Also read the “Discussion” and “Summary” sections on pages 266 and 267. Skim intervening section and note images of affected workers.
- B. “Chemical Safety Data Sheet SD-56: Properties and Essential Information for Safe Handling and Use of Vinyl Chloride,” Adopted 1954, Manufacturing Chemists’ Association, Inc, From the Chemical Industry On-line Archive. Read pp.3-5; and pp. 14-16 (“Section 7: WASTE DISPOSAL and Section 8: HEALTH HAZARDS AND THEIR CONTROLS”). Skim the rest of the document.
- C. Union Carbide Corporation, Inter-Company Correspondence, November 24, 1959.

Ask students to reflect and write their responses to the following questions:

1. Who were the authors of this document? What do you know—or think you know—about the authors?
2. Who was the intended audience of this document?
3. Why do you think this document was written? What evidence does the document contain that makes you think it was produced for that reason? Please refer to specific quotes from the document.
4. What does the document say about the potential effects of plastics and chemicals involved in plastic production on human health?
5. List three questions that are left unanswered by the document.

Large-group Discussion:

After working independently with their assigned document, students should share their analyses of the documents. After each document has been discussed ask students why the author of the 1959 Union Carbide memo did not want the memo quoted? What is the significance of the memos and what are some of the possible outcomes of it? In this discussion, students should make connections back to the previous lesson and talk about the cultural, economic, and political factors that made plastics so popular in the postwar era. They should also begin to think about the issue of how to deal with scientific uncertainty in the face of regulating potentially harmful chemicals. If Activity 1.3 is assigned as homework, this large-group discussion can be used as a starting point for the following lesson.

Activity 1.4: Homework

Students should read portions of Rachel Carson’s *Silent Spring*, answer the following questions, and be prepared to discuss their ideas in lesson two.

Read Rachel Carson, *Silent Spring* (New York: Houghton Mifflin, 1982), chapters 1,2 and part of 3, pp. 1-37.

Homework Questions:

1. What is the purpose of the book?

2. Why was Carson so concerned about ways in which humans have changed the environment since WWII?
3. Carson argues that Americans have a right not to be exposed to toxic chemicals. Do you agree or disagree? Why and under what conditions?
4. In your mind, whose duty is it to protect people from toxic chemicals? Why?
5. How do you think the chemical industry received the arguments Carson makes in *Silent Spring*?
6. Is *Silent Spring* a primary source or a secondary source? Why do you think so? Explain your answer.

Lesson 1 Reinforcement Activity: Analyzing a WWII-era Film by the Chemical Industry

If there is time available, before exploring the documents and questions in Activity 1.2, students can view a film created by the chemical industry in the 1940s to inspire young scientists to become chemists. It demonstrates how chemical companies used media to portray a wide variety of ways in which chemicals will benefit postwar society. After viewing the 9-minute video, ask students to respond to the following reflection questions:

1. What is the central message(s) of this video?
2. How do you think the filmmakers wanted the audience to respond?
3. What does this type of media say about the topic that would not be conveyed by a written source? Please be specific.
4. Write two questions that are left unanswered by the film.

Document:

A. "Test Tube Tale," 1941. Vintage Chemical Industry Films, Quality Information Publishers. (http://teachertube.com/viewVideo.php?video_id=4171)

Additional Teacher Resources:

1. The American Chemistry Council's History of Plastic:
http://www.americanchemistry.com/s_plastics/doc.asp?CID=1102&DID=4665
2. Jeffery L. Meikle, *American Plastic: A Cultural History*, New Brunswick, N.J.: Rutgers University Press, 1995.