Optional
History of Chemistry

Goal: Students will understand the historical development of chemicals.

Objectives: Students will…
- Understand how the development of chemicals has shaped their everyday lives.
- Create a classroom timeline of major events in the history of chemistry.

Materials (for a class of 32 working in groups of 3):
- 32 copies of History of Chemistry Timeline and Skit Requirement Sheet
- 32 copies of History of Chemistry Student Timeline
- 32 copies of History of Chemistry Chemical History Timeline
- 6–8 pieces of poster board
- Markers
- 30–40 large brown paper bags
- Overhead or large chalkboard
- Photocopies of research materials

Time Required: 45–60 minute class period

Standards Met: E18, WH1-9, USH1-10, G5, LA4, LA7, LA8

Green Chemistry Principles Addressed: 1–12

Procedure:
PREP
- Obtain a number of poster boards and draw a straight line across each one to represent a timeline.
- Obtain several (30-40) brown paper bags for skits.
- Gather research materials or arrange for research to be done on the Internet. See attached timeline. Information for the timeline was taken from the following websites:
  http://inst.santafe.cc.fl.us/~dsimon/chem/time.htm
  http://www.pafko.com/history/h_time.html
  http://www.sciencetimeline.net/
- Gather any art materials to enhance student timelines.

IN CLASS
- Place students into groups of three.
- Randomly assign each group to a historical period or let the groups pick their time period out of a hat as follows:
  8000 B.C.–600 A.D.
  600 A.D.–1610
  1610–1780
  1780–1856
  1856–1920
  1920–1930

1930–1945
1945–1968
1968–2000
2000–Present

- Explain that students will now research their historical time period for interesting developments in the history of chemistry or chemical processes using the Internet or paper resources you have provided.
- Explain that each group needs to find three important developments in their time period and add it to their timeline poster board.
- Explain that there are two parts to this assignment. Students will create a timeline and they will also develop and enact a paper bag skit highlighting events during their period of the history of chemicals. (Students will use the paper bags to serve as costumes and props throughout their skits—see the paper bag skit requirements on the History of Chemistry Timeline and Skit Requirements Student Sheet).
- Hand out the History of Chemistry Timeline and Skit Requirements Student Sheet.
- Review the History of Chemistry Timeline and Skit Requirements Student Sheet with students—this would be a good time to explain B.C. and A.D. for your students if that is a new concept to them.
- Hand out one poster board to each group. Explain that they are to begin by labeling the beginning and end dates of their historical time period on opposite ends of the board.
- Hand out the History of Chemistry Chemical History Timeline
- Explain that students will now research their time period using the History of Chemistry Chemical History Timeline and other research sources that you have arranged (Internet, books, etc.).
- Give students time to research, create a timeline, and create a skit.
- Check in with each group to be sure that they are on the right track.
- Make colored pencils, markers, etc. available for each group.
- Bring the group back together and hand out the History of Chemistry Student Timeline. Remind students that they will be filling out their own personal timeline on the History of Chemistry Student Timeline based upon the information from each group. You might want to create a transparency of the History of Chemistry Student Timeline and complete it after each skit. (You may want to give students time at the end of class to complete this task based on the information on the wall so that they can enjoy the skits as they happen.)
- Begin student presentations by reminding students of guidelines. Review skit requirements.
- Begin student presentations going chronologically from the earliest time period to the present day and have each group add their poster board to the wall.
- After each presenter, review the items added to the timeline.
- Presentations should not be longer than three minutes each.
- Skits should not be longer than five minutes each.
- Keep the timeline on the wall in your classroom during the Green Chemistry unit.

Follow-Up:
Option One

- Have students bring in an item from home that is possible today because of a development they discovered in the history of chemistry.
  EXAMPLE: A plastic grocery bag relates to the invention of plastic in 1856.
- Have students staple or affix these items to the classroom timeline.

Option Two

- Have students create a future timeline based upon things that will be discovered or invented in the future.
- Encourage them to think of fun and wacky things as well as things that the world needs to solve current problems.

Assessment:

- Use the History of Chemistry Timeline Skit Grading Rubric. Give a grade for the completed personal timeline.

History of Chemistry
Timeline and Skit Requirements Student Sheet

Timeline Requirements:

- Use provided poster board with line already drawn on it
- Begin by placing starting and ending dates of the historical time period on either end of poster board
- Include three important events in the time period
- Must include visuals/artwork/pictures, etc.
- Names of all group members
- During skits, record the chemistry timeline that your class is creating on your own personal History of Chemistry Student Timeline

Paper Bag Skit Requirements:

- ONLY use paper bags as props
- Can color, cut, and/or tape bags
- Must include a visual outlining the dates of events in your skit
- Must portray highlights and prominent figures in the time period
- Cannot be longer than three minutes
- Should be FUN!!!

History of Chemistry Student Timeline

Name: _____ Date: _____

Include information you learn and present during the paper bag skits on all History of Chemistry time periods.

History of Chemistry
Timeline Skit Grading Rubric

Name: _____

	Criteria				Points
	1	2	3	4	
Organization	Audience cannot understand presentation because there is no sequence of information.	Audience has difficulty following presentation because student jumps around.	Student presents information in logical sequence which audience can follow.	Student presents information in logical, interesting sequence which audience can follow.	____
Content Knowledge	Student does not have grasp of information.	Student is uncomfortable with information and it is confusing.	Student is at ease with content, but fails to elaborate.	Student demonstrates full knowledge (more than required) with explanations and elaboration.	____
Visuals	Student used no visuals.	Student occasionally used visuals that rarely support the information and presentation.	Visuals are related to information and presentation.	Student used visuals to reinforce information and presentation.	____
Delivery	Student mumbles, incorrectly pronounces terms, and speaks too quietly for students in the back of the class to hear.	Student incorrectly pronounces terms. Audience members have difficulty hearing presentation.	Student's voice is clear. Student pronounces most words correctly.	Student used a clear voice and correct, precise pronunciation of terms.	____
				Total Score⟶	____

History of Chemistry
Chemical History Timeline

8000 B.C.–600 A.D.

8000 B.C. Fermentation – The first evidence of wine and beer used in the chemical process of fermentation

5000 B.C. Ancient Mesopotamians (a region now known as Iraq) used tanning to make leather from animal hides.

6000 B.C. Evidence of the first Linen fabric made in several regions of the world

4000 B.C. Papyrus or paper first used in Egypt

1000 B.C. People in China and the Middle East begin to use enzymes to make cheese from milk; dates back at least 3,000 years

2800 B.C. Glass invented

2500 B.C. Iron discovered

2000 B.C. Chinese discovered magnetic attraction

400 B.C. Sugar first used in food and as a form of currency

600 A.D.–1610

600 A.D. Chinese invent explosives

850 Moors in Spain first prepared pure copper by reacting its salts with iron

1180 First glass windows appear in dwellings in the Middle East

1199 Alexander Neckam makes the first known Western reference to the magnetic compass

1200 By the twelfth century, alchemists had developed the art of distillation to the stage at which distillates could be captured by cooling in a flask

1266 Hugh and Theodoric Borgogoni advocated putting surgical subjects to sleep with narcotic-soaked sponges. They also recommended that wounds should be "cleaned with wine, the edges brought together with stitches, and left for nature to heal".

1285 Alessandro della Spina invented spectacles for far-sightedness

1589 The water closet or toilet invented by Sir John Harrington in England, but indifference to filth and lack of sewage meant that the invention was largely ignored until 1778

1590 Zacharias and Hans Janssen combined double convex lenses in a tube, producing the first telescope

1610–1780

1610 First chemistry book written which catalogues chemicals and their interactions

1641 Arsenic used as a medicine

1649 Descartes held that a person's emotions were basically physiological or came from the physical

1651 Harvey published the concept that all living things originate from eggs

1658 Henry More argued "the first primary matter must be atoms and that matter may be so small as to be indiscernible"

1670 Boyle produced hydrogen by reacting metals with acid

1683 Antoni von Leewenhoek discovers bacteria

1709 Gabriel Daniel Fahrenheit constructed an alcohol thermometer and, five years later, a mercury thermometer

1728 Pierre Fauchard described preventive measures to keep teeth healthy as well as inventing the word 'dentist'

1738 Daniel Bernoulli asserted the principle that as the speed of a moving fluid increases, the pressure within the fluid decreases. In the process of determining this, he invented the 'molecular theory of gases', i.e., a gas's temperature is a function of the average speed of its particles.

1742 Anders Celsius developed the centigrade temperature scale which carries his name

1751 Axel Fredric Cronstedt discovered nickel

1780–1856

1805 Friedrich Sertürner isolated morphine from the poppy plant

1810 Volta invents the electric battery

1769 Watt invents the modern steam engine

1777 Lavoisier proposes idea that chemical compounds are made up of elements

1780 Matches invented

1783 Lazaro Spallanzani performs experiments demonstrating that digestion is a chemical process rather than a mechanical grinding of the food

1805 Friedrich Sertürner isolated morphine from the poppy plant

1810 Volta invents the electric battery

1811 Berzelius simplified chemistry through his suggestion that they be represented by the first letter of each element's Latin name, with the addition of the second letter when necessary, therefore creating the first periodic table.

1820 J. B. Caventou and P. J. Pelletier isolated quinine from cinchona bark

1839 Goodyear invented vulcanized rubber

1853 Alexander Wood introduced the hypodermic syringe which was used as a morphine delivery system in the American Civil War

1856–1920

1859 Cocaine was isolated and patented by Merck three years later

1867 Joseph Lister initiated use of antiseptics in surgery

1895 Roentgen discovered x-radiation

1856 First plastic manufactured

1860 Louis Pasteur introduced heat-sterilization of wine and milk (pasteurization)

1866 Nobel invents dynamite

1876 Robert Koch devised the method of employing aniline dyes to stain microorganisms. By this means he was able to isolate pure cultures of bacteria and showed the bacterial origin of many infectious diseases, including tuberculosis, cholera, bubonic plague, and sleeping sickness. This confirmed the germ theory of disease.

1886 Coca-Cola® invented by Pemberton [more than 600 million sold daily in 1997]

1888 Heinrich Hertz discovered radio waves

1895 Wilhelm Roentgen discovered that certain chemicals near a cathode ray tube glowed. Found highly-penetrating rays that were not deflected by a magnetic field, which he named 'x-rays'.

1906 Food and Drug Administration founded

1912 Cellophane invented

1920–1930

1920 Polyester invented

1921 First household refrigerators [ice machine invented 1865 by Lowe]

1922 Calmette & Guerin develop BCG vaccine for tuberculosis

1923 Production of insulin to treat diabetes

1923 Herbert M. Evans and K. Scott Bishop discovered vitamin E

1923 Electrolux produced the first electric refrigerator

1924 Baird inventor of first TV

1927 Einstein and Leo Szilard applied for a patent on a pump for liquid metals using a magnetic field to induce a ponderomotive force on a closed current loop in the fluid conductor. These pumps are used to circulate liquid sodium coolant in nuclear reactors.

1928 Sir Alexander Flemming discovers the antibiotic penicillin

1930–1945

1930 Photoflash bulbs are invented

1935 Nylon invented

1937 Polystyrene sold in the U.S. by Dow Chemical

1939 Muller synthesizes DDT, a chemical later used in pesticides

1945–1968

1945 Atomic bomb used in warfare

1953 In London Rosalind Franklin and Maurice Wilkins carry out X-ray crystallography studies of DNA.

1954 Hydrogen bomb tested

1954 The American doctor and epidemiologist Jonas Salk develops a polio vaccine which is used in a mass inoculation programme which will start in 1954.

1962 In America, Rachel Carson writes her book 'Silent Spring', which makes people aware for the first time of the way chemicals are being introduced into the environment.

1963 Guilio Natta of Italy and Karl Zeigler of Germany win the Nobel prize for chemistry for their synthesis of polymers and plastics.

1965 A vaccine against measles becomes available

1968–2000

1968 Steps to ban use of DDT

1972 The use of DDT is restricted in America in a move to protect the environment after it is discovered that DDT accumulates in the food chain.

1973 A calf is produced from a frozen embryo for the first time.

1974 Sherwood Rowland and Mario Molina warn that CFCs used in fridges and as aerosol spray propellants might be damaging the ozone layer in the atmosphere. This protects the Earth against excessive ultraviolet radiation from the Sun.

1974 Some scientists call for a halt in the development of genetic engineering until the implications of what it might lead to are better understood.

1978 First test tube baby born in England

1989 Exxon Valdez spills 19 million gallons of crude oil off the coast of Alaska

2000–Present

2001 Craig Ventner and his colleagues publish the complete genetic code of the laboratory mouse.

2003 Stem cells extracted from the bone marrow are used to treat patients with heart failure for the first time in Brazil by Emerson C Perin and Hans F. R. Dohmann.

2003 Dolly the sheep, the first mammal successfully cloned from an adult cell, dies aged 6 years.

2004 In a breakthrough for nanotechnology in medicine, Ehud Shapiro and his team at the Weizmann Institute of Science in Israel make a molecular DNA computer which can detect the presence of diagnostic markers for cancer – and then release treatment molecules in the right place. Although this has only been tested in test-tubes, body trials are expected soon.

2004 Hwang Woo Suk of Seoul National University leads a team which develops the first mature cloned human embryos, growing and harvesting embryonic stem cells from them.