

## CHAPTER 6, LESSON 12: NATURAL RESOURCES AND SYNTHETIC MATERIALS

### Plastic Bags

- Stopwaste.org, From Oil to Plastic  
<https://www.youtube.com/watch?v=IwdUwffecsM&nohtml5=False>
- The Atlantic, What is Crude Oil, Exactly?  
<https://www.youtube.com/watch?v=62LvVYYqUFA>
- How Stuff Works, Plastics  
<http://science.howstuffworks.com/plastic.htm>
- How Stuff Works, Which is more environmentally friendly: paper or plastic?  
<http://science.howstuffworks.com/environmental/green-science/paper-plastic.htm>
- Canadian Plastics Industry Association, All About Bags, Paper vs. Plastic Bags  
<http://www.allaboutbags.ca/papervplastic.html>
- Ecomyths Busted, Myth: Paper Bags Are Greener Than Plastic  
<http://ecomyths.org/2014/05/27/myth-paper-bags-are-greener-than-plastic/>

### Plastic Bottles

- American Chemistry Council, The Basics: Polymer Definition and Properties  
<https://plastics.americanchemistry.com/Education-Resources/Plastics-101/The-Basics-Polymer-Definition-and-Properties.html>
- Thomasnet.com, Plastic Bottle Manufacturing  
<http://www.thomasnet.com/articles/materials-handling/plastic-bottle-manufacturing>
- Explain That Stuff!, Glass  
<http://www.explainthatstuff.com/glass.html>
- Environmental Impact, Environmental Impact of Glass Production  
<http://envimpact.org/glass>
- The Vermont Juice Co., Glass vs. Plastic  
<http://www.vtjuiceco.com/learn/plastic-vs-glass/>
- Packaging of the World, Plastic vs. Glass—Why plastic containers are better  
<http://www.packagingoftheworld.com/2014/04/plastic-vs-glass-why-plastic-containers.html>
- Washington Post, Why glass jars aren't necessarily better for the environment than plastic jars  
[https://www.washingtonpost.com/national/health-science/why-glass-jars-arent-necessarily-better-for-the-environment-than-plastic-ones/2014/06/23/2deecfd8-f56f-11e3-a606-946fd632f9f1\\_story.html](https://www.washingtonpost.com/national/health-science/why-glass-jars-arent-necessarily-better-for-the-environment-than-plastic-ones/2014/06/23/2deecfd8-f56f-11e3-a606-946fd632f9f1_story.html)
- Academy of Nutrition and Dietetics, Eat Right, Glass Versus Plastic Containers  
<http://www.eatright.org/resource/homefoodsafety/four-steps/refrigerate/glass-versus-plastic-containers>
- Oregon Public Broadcasting, Which Is Greener? It's Not What You'd Expect  
<http://www.opb.org/news/blog/ecotrope/which-is-greener-its-not-what-you-d-expect/>

## Disposable Diapers

- University of Minnesota, Diaper Choices  
<http://www.extension.umn.edu/environment/water/diaper-choices/>
- Stanford Alumni, Don't Pooh- Pooh My Diaper Choice  
[https://alumni.stanford.edu/get/page/magazine/article/?article\\_id=56347](https://alumni.stanford.edu/get/page/magazine/article/?article_id=56347)
- National Geographic, How Disposable Diapers are Made  
<https://www.youtube.com/watch?v=kG-oWwI8L9M>
- Appropedia, Cloth vs. Disposable Diapers  
[http://www.appropedia.org/Cloth\\_vsus\\_disposable\\_diapers](http://www.appropedia.org/Cloth_vsus_disposable_diapers)
- Healthline, The Diaper Wars: Cloth vs. Disposable  
<http://www.healthline.com/health/parenting/cloth-vs-disposable-diapers#1>

## Synthetic Fiber and Cloth (Polyester, Nylon, Rayon)

- ChemMatters, Nylon  
<https://www.acs.org/content/dam/acsorg/education/resources/highschool/chem-matters/archive/chemmatters-dec1990-nylon-kydd.pdf>
- FiberSource, A Short History of Manufactured Fibers  
<http://www.fibersource.com/f-tutor/history.htm>
- Explain That Stuff, Nylon  
<http://www.explainthatstuff.com/nylon.html>
- Science360, Fabricating Fabric: Profile of Nylon  
<https://science360.gov/obj/tkn-video/81d0ca7e-1741-4f03-ad99-aea708639e68>
- Smithsonian, How 75 Years Ago, Nylon Stockings Changed the World  
<http://www.smithsonianmag.com/smithsonian-institution/how-75-years-ago-nylon-stockings-changed-world-180955219/?no-ist>
- How Products are Made, Rayon  
<http://www.madehow.com/Volume-1/Rayon.html>
- Textile Exchange, The Manufacturing Process of Rayon  
<http://www.teonline.com/knowledge-centre/manufacturing-process-rayon.html>
- Chemistry Explained, Fibers  
<http://www.chemistryexplained.com/Fe-Ge/Fibers.html>
- How Stuff Works, Why is Cotton More Absorbent than Nylon?  
<http://home.howstuffworks.com/home-improvement/household-hints-tips/cleaning-organizing/question547.htm>
- Quatr.us, What is Polyester?  
<http://quatr.us/clothing/after1500/polyester.htm>
- Sewing Parts Online, Cotton vs. Polyester  
<http://www.sewingpartsonline.com/blog/411-cotton-vs-polyester-pros-cons/>
- How Stuff Compares, Cotton vs. Polyester  
<http://www.howstuffcompares.com/doc/c/cotton-vs-polyester.htm>

## Kevlar

- ChemMatters, Fabric of Steel  
<https://www.acs.org/content/dam/acsorg/education/resources/highschool/chem-matters/archive/chemmatters-oct1990-kevlar-banks.pdf>
- Explain That Stuff, Kevlar  
<http://www.explainthatstuff.com/kevlar.html>
- How Stuff Works, Stuff or Genius, Stephanie Kwolek  
<http://shows.howstuffworks.com/stuff-of-genius/40371-the-stuff-of-genius-kevlar-video.htm>
- Making the Modern World, Kevlar  
[http://www.makingthemodernworld.org.uk/learning\\_modules/chemistry/03.TU.02/?section=10](http://www.makingthemodernworld.org.uk/learning_modules/chemistry/03.TU.02/?section=10)
- Science 360, Chance Discoveries, Kevlar  
<http://science360.gov/obj/video/ff988118-72a9-404c-b3dd-b0a065239655>

## Artificial Sweetener

- ChemMatters, The Skinny on Sweeteners: How Do They Work?  
<https://www.acs.org/content/dam/acsorg/education/resources/highschool/chem-matters/archive/chemmatters-oct2011-sweeteners-brownlee.pdf>
- ChemMatters, Artificial Sweeteners  
<https://www.acs.org/content/dam/acsorg/education/resources/highschool/chem-matters/archive/chemmatters-feb1988-sweeteners.pdf>
- Scientific American, Sugar vs. Artificial Sweeteners  
<http://www.scientificamerican.com/article/sugar-vs-artificial-sweeteners/>
- CNN, Real or Fake Sugar: Does it Matter?  
<http://www.cnn.com/2013/07/15/health/artificial-sweeteners-soda/>
- Discovery Communications, Seeker, Artificial Sweetener Leaves Environmental Aftertaste  
<http://news.discovery.com/earth/artificial-sweetener-not-removed-by-sewage-treatment-110623.htm>
- American Chemical Society, Environmental Science and Technology, Artificial Sweetener Persists in the Environment  
<http://pubs.acs.org/doi/pdf/10.1021/es087043g>
- World Wildlife Fund, Sustainable Agriculture – Sugarcane  
<http://www.worldwildlife.org/industries/sugarcane>
- Discover, The Chemistry of Artificial Sweeteners  
<http://discovermagazine.com/2005/aug/chemistry-of-artificial-sweeteners>

## Synthetic Rubber

- American Chemical Society, National Historic Chemical Landmarks, U.S. Synthetic Rubber Program  
<http://www.acs.org/content/acs/en/education/whatischemistry/landmarks/syntheticrubber.html>
- Explain that Stuff, Rubber  
<http://www.explainthatstuff.com/rubber.html>
- Akron Global Polymer Academy, A Brief History of Rubber  
<https://www.youtube.com/watch?v=rHhD6YhsGk0>
- Discovery Communications, How It's Made - Natural Rubber  
<https://www.youtube.com/watch?v=CKq42J7SaWw>
- Discovery Communications, How It's Made - Synthetic Rubber  
[https://www.youtube.com/watch?v=SedGDg2K\\_al](https://www.youtube.com/watch?v=SedGDg2K_al)

## Synthetic Fuel

- ChemMatters, Do You Want Biodiesel with That?  
<https://www.acs.org/content/dam/acsorg/education/resources/highschool/chem-matters/archive/chemmatters-april2005-biodiesel-kirchhoff.pdf>
- ChemMatters, Green Gasoline: Fuel from Plants  
<https://www.acs.org/content/dam/acsorg/education/resources/highschool/chem-matters/archive/chemmatters-feb2010-greenfuel-schirber.pdf>
- How Stuff Works, What is a Synfuel?  
<http://auto.howstuffworks.com/fuel-efficiency/biofuels/synfuel.htm>
- How Stuff Works, Top 8 Synthetic Fuels  
<http://auto.howstuffworks.com/fuel-efficiency/biofuels/8-synthetic-fuels.htm>
- Princeton University, Synthetic Fuels Could Eliminate U.S. Need for Crude Oil  
<https://www.princeton.edu/main/news/archive/S35/39/49I49/index.xml?section=topstories>

## Taxol (Cancer drug)

- National Cancer Institute, Natural Compound Helps treat Breast and Ovarian Cancer  
<http://www.cancer.gov/research/progress/discovery/taxol>
- National Cancer Institute, Success Story – Taxol  
[https://dtp.cancer.gov/timeline/flash/success\\_stories/S2\\_Taxol.htm](https://dtp.cancer.gov/timeline/flash/success_stories/S2_Taxol.htm)
- American Chemical Society, National Historic Chemical Landmark – Discovery of Camptothecin and Taxol  
<http://www.acs.org/content/acs/en/education/whatischemistry/landmarks/camptothecintaxol.html>
- American Chemical Society, Chemical and Engineering News - Taxol  
<https://pubs.acs.org/cen/coverstory/83/8325/8325taxol.html>

### Physostigmine (Glaucoma drug)

- ChemMatters, Percy Julian: Rising above Racism  
<https://www.acs.org/content/dam/acsorg/education/resources/highschool/chem-matters/archive/chemmatters-oct2007-percyjulian-brownlee.pdf>
- Chemical Heritage Foundation, Science Alive, Physostigmine and Glaucoma  
<http://www.chemheritage.org/percy-julian/history/5.html>
- Chemical Heritage Foundation, Science Alive, Synthetic vs. Natural: What's the Difference?  
<http://www.chemheritage.org/percy-julian/activities/5a.html>
- American Chemical Society, National Historic Chemical Landmark, Percy L. Julian and the Synthesis of Physostigmine  
<http://www.acs.org/content/acs/en/education/whatischemistry/landmarks/julian.html>
- Chemical Heritage Foundation, Science Alive, What is Synthesis?  
<http://www.chemheritage.org/percy-julian/activities/3c.html>

### Chloroquine (Malaria drug)

Encyclopedia.com, Chemical Synthesis

[http://www.encyclopedia.com/topic/Chemical\\_synthesis.aspx](http://www.encyclopedia.com/topic/Chemical_synthesis.aspx)

Medicines for Malaria Venture, History of Antimalarials

<http://www.mmv.org/malaria-medicines/history-antimalarials>

### Cortisone (Arthritis drug)

- Encyclopedia.com, Percy Lavon Julian  
[http://www.encyclopedia.com/topic/Percy\\_Lavon\\_Julian.aspx](http://www.encyclopedia.com/topic/Percy_Lavon_Julian.aspx)
- PBS, NOVA, Percy Julian : Forgotten Genius – Making Cortisone from Plants  
<http://www.pbslearningmedia.org/resource/drey07.sci.phys.matter.cortisone/making-cortisone-from-plants/>

### Aspirin

- ChemMatters, Aspirin  
<https://www.acs.org/content/dam/acsorg/education/resources/highschool/chem-matters/archive/chemmatters-feb1993-aspirin-marsella.pdf>
- About.com, Inventors, History of Aspirin  
<http://inventors.about.com/library/inventors/blaspirin.htm>
- Chemical Heritage Foundation, Aspirin: Turn of the Century Miracle Drug  
<http://www.chemheritage.org/discover/media/magazine/articles/27-2-aspirin.aspx>
- The Conversation, Natural Medicine is Great but Chemists Can Make it Even Better  
<http://theconversation.com/natural-medicine-is-great-but-chemists-can-make-it-even-better-28362>